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NAVENVPREDRSCHFAC
TECHNICAL REPORT
TR 80-06

LEVEL II (12)

FREQUENCY OF ADVERSE WEATHER CONDITIONS AFFECTING HIGH ENERGY LASER SYSTEMS OPERATIONS

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NOVEMBER 1980

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Certain graphs of cumulative frequencies of rainrates (bottom graphs on pages listed below) are incorrectly scaled along the vertical (y) axis. Data plots shown on the affected graphs, however, are correct.

The following changes should be made:

Pp 18, 50-57, 70-81:

Change scale	81.0	to read	84.0
	82.0		88.0
	83.0		92.0
	84.0		96.0
	85.0		100.0

Pp 58-61, 66-69, 86-93:

Change scale	91.0	to read	92.0
	92.0		94.0
	93.0		96.0
	94.0		98.0
	95.0		100.0

Pp 62-65, 82-85:

Change scale	82.0	to read	84.0
	84.0		88.0
	86.0		92.0
	88.0		96.0
	90.0		100.0

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The planning of high energy laser system operations depends on a knowledge of possible environmental parameters likely to affect the system. Most basically, the planner needs to know the probability that the system will be usable because of adverse weather conditions.

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20. Abstract (continued)

The most fundamental environmental conditions inhibiting laser use are high rain rates and low visibility due to fog, haze or dust. This report calculates the frequency of occurrence of these conditions as a function of geographic location. The geographical locations chosen were those which may have possible laser operations, and include the Persian Gulf, North Atlantic, Mediterranean, Southeast Asia, Korea, and the Caribbean Sea.

With a limiting 3 hour average rain rate of 3 mm/hr, the frequency of occurrence of the rain limitation is no greater than 3%. This depends on latitude - higher latitudes having lesser rain rates - as well as time of year. The limiting visibility condition was considered to be 1 km. Visibility less than 1 km was generally related to fog and as such is also related to latitude. In the tropical areas the visibility limitation occurred less than 1% of the time regardless of time of year. In polar and subpolar locales, limited visibility occurred over 20% of the time (Kamchatka, in July).

CONTENTS

1. INTRODUCTION

1.1 PURPOSE

The purpose of this effort was to determine the frequency of occurrence of weather conditions which preclude operation of the high energy laser system (HELS) in real operational conditions. The limitations include range obscuration by rain, fog and haze, as well as the humidity and aerosols.

1.2 OBJECTIVE

The objective of this project was to produce a climatology of the following variables for various Marsden Squares: rainrate; visibility; total extinction coefficient over the wavelength band used by the HELS pointer-tracker(8-12 μm); molecular extinction coefficient for the mid-range infrared advanced chemical laser (MIRACL) spectrum. The climatology was expressed in terms of the average frequency with which specified values of the above variables were reported.

1.3 BACKGROUND

The decision to deploy a High Energy Laser System (HELS) as part of a weapon suite depends on the vulnerability of the HELS to expected weather conditions. The environmental factors which influence the system are scattering and absorption by atmospheric aerosols and molecules, nonlinear effects, such as thermal blooming, and turbulence-induced laser beam wander. These effects are not directly measurable with standard meteorological instrumentation, but correlation models can be used to relate archived

meteorological measurements to the desired meteorological parameters. The collected and analyzed results predict the frequency of occurrence of weather conditions affecting the HELS.

2. DATA

2.1 DATA BASE

A consolidated Data Set (CDS) has been created at Fleet Numerical Oceanography Center (FNOC) using the National Climatic Center's marine surface observation archives (TDF-11) and FNOC's surface observation archives (SPOT). These data have been organized by Marsden Square and are stored on magnetic tape. Each tape consists of multiple files of Marsden Squares. Within each Marsden Square data are ordered by 1-degree subsquare. Within each subsquare data are ordered chronologically over the period 1946-1977.

2.2 SOURCE DATA

Data used in the analysis was a subset of the CDS. The period 1963-1973 inclusive was chosen as the analysis period. Therefore, up to eleven years of observations have been used to calculate a set of environmental statistics.

The analysis concentrated on geographic areas which were considered possible future HELS operating areas. These areas were the Persian Gulf (Marsden Sq. 102-103), North Atlantic (Marsden Sq. 145-147), Southeast Asia (Marsden Sq. 26), Korea (Marsden Sq. 131-132), and the Caribbean (Marsden Sq. 44). These locations are described in Figure 1 and Table 1.

As each record was processed the data were checked for (1) parity errors, (2) correct packing arrangement of the observations (i.e., the number of words in the record must be equal to some multiple of 5), and (3) agreement of the air-sea temperature

Number of Marsden square in which the sta'i^n is situated at the time of observation

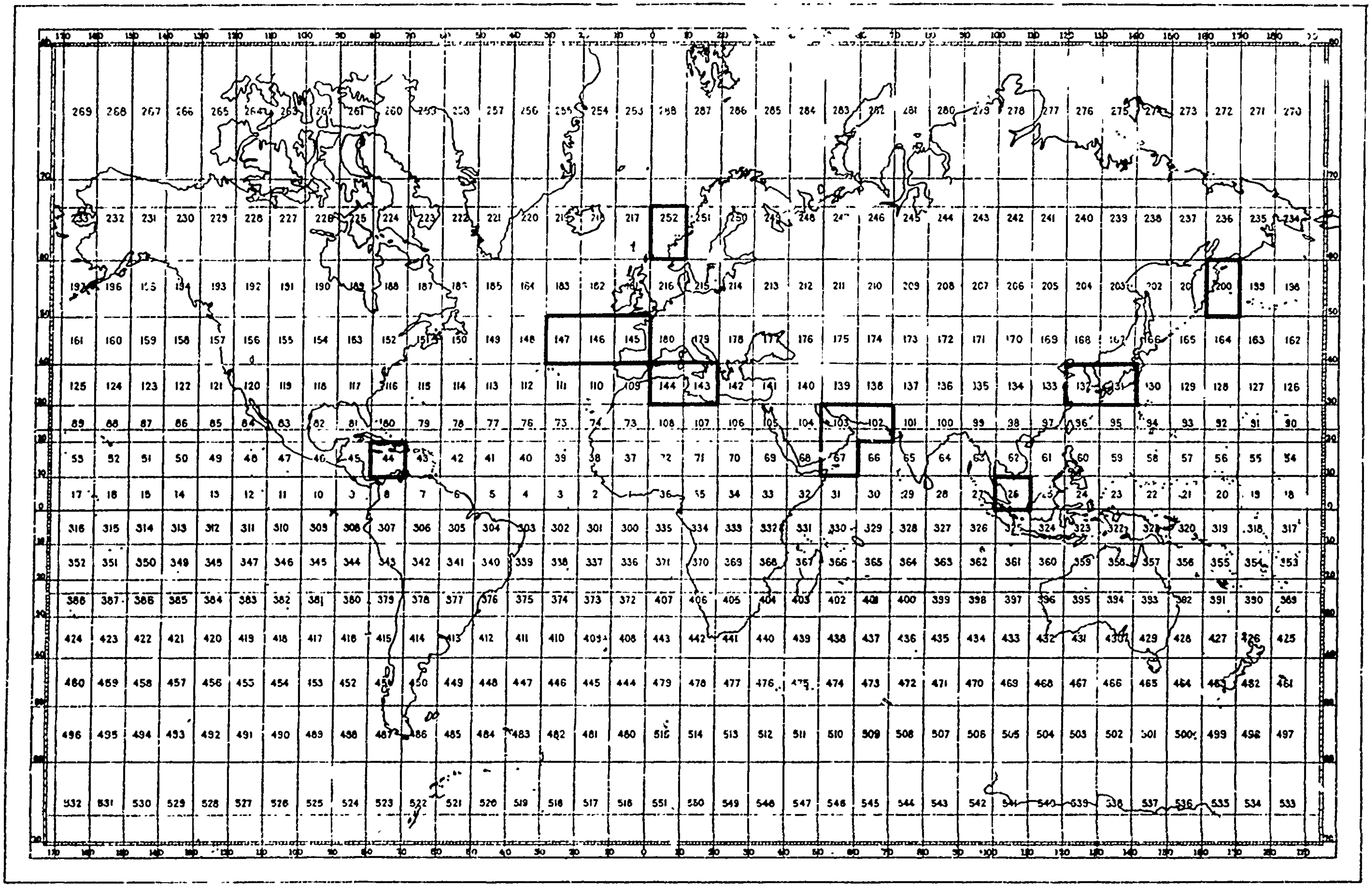

Figure 1. Study area by Marsden Square number.

difference with the difference of air temperature and sea surface temperature. Records which failed these checks were dropped from the analyzed data base.

Table 1. List of Marsden Squares analyzed.

Square	Geographic Area
102-103	Persian Gulf
67	Arabian Sea
26	Southeast Asia
131-132	Korea
200	Kamchatka Peninsula
44	Caribbean Sea
145-147	North Atlantic Ocean
252	Norway
143-144	Mediterranean Sea

2.3 DISTRIBUTION OF OBSERVATIONS

A wide variation in the temporal distribution of the observations was noted. A given month of some years had few or no reports while the same month of other years had many reports. The temporal distribution varied for each Marsden Square analyzed. It was determined that a simple averaging of the data over the entire analysis period would yield mean values that would be biased by the data from years with many observations. An alternate method of computing mean values was chosen in which monthly averages were calculated for each year with one or more reports for the given month. These monthly averages were then averaged to obtain mean values for the entire analysis period. This method of computing the means had the effect of limiting the bias introduced by years that had many reports relative to other years. The averages of the parameters were averaged over the Marsden subsquare averages to produce a Marsden square average. The procedure for calculating mean values for each Marsden square gave equal weight to all subsquares with reports.

3. METHODOLOGY

3.1 OVERVIEW

The parameter correlation models described in this section were used to calculate the HEL's characteristics associated with each observation recorded on the CDS tapes. The resulting values for the HEL's variables were grouped by month and Marsden subsquare and averaged. The resulting means then were grouped by Marsden square for the entire analysis period and averaged.

3.2 COMPUTER PROCESSING

A computer program was developed to process the thousands of weather observations that formed the data base for the analysis. The data recorded on the CDS tapes was known to be relatively free of data gaps and errors so only a few quality control checks were included in the program. Speed in operation and the production of conveniently formatted output (tables and graphs) were the main features of the program.

Below is a list of the primary functions of MARPLT (Marsden Square Plotting) program:

1. Read the data from the CDS tape.

2. Establish that the record is acceptable for processing (check for parity error, EOF marker, packing arrangement of the observations).

3. Unpack the coded data using a masking expression and the SHIFT intrinsic function.

4. Select only those observations taken during the 1963-1973 time period.

5. Calculate values for the following variables: visibility, rainrate, molecular absorption coefficient, molecular extinction coefficient, and extinction coefficient for the MIRACL spectrum.

6. Calculate the cumulative frequency of occurrence of: visibility less than or equal to 1 km, rainrate greater than or equal to 2 millimeters per hour (mm/hr), molecular extinction coefficient (8-12 μm) greater than or equal to 0.8 per kilometer, and MIRACL spectrum extinction coefficient greater than or equal to 0.28 per kilometer.

7. Calculate the frequency of occurrence of rainrates for 21 intervals ranging from 0 to greater than 10 mm/hr in 0.5 mm/hr increments and grouped by month.

8. Calculate the cumulative frequency of occurrence of rainrates for the 21 intervals for the months of March, June, September, and December.

9. Calculate the mean and standard deviation, grouped by month and Marsden subsquare, of the following parameters: molecular extinction coefficient (8-12 μm), and MIRACL spectrum extinction coefficient.

10. Produce an output of tables and graphs summarizing the statistics.

The flow chart in Figure 2 illustrates the flow of data through MARPLT, showing a closed loop which will analyze all observations within a Marsden square file before terminating. The numbers appearing at the upper right corner of each box relate the operation to one of the ten functions outlined above. Details of the

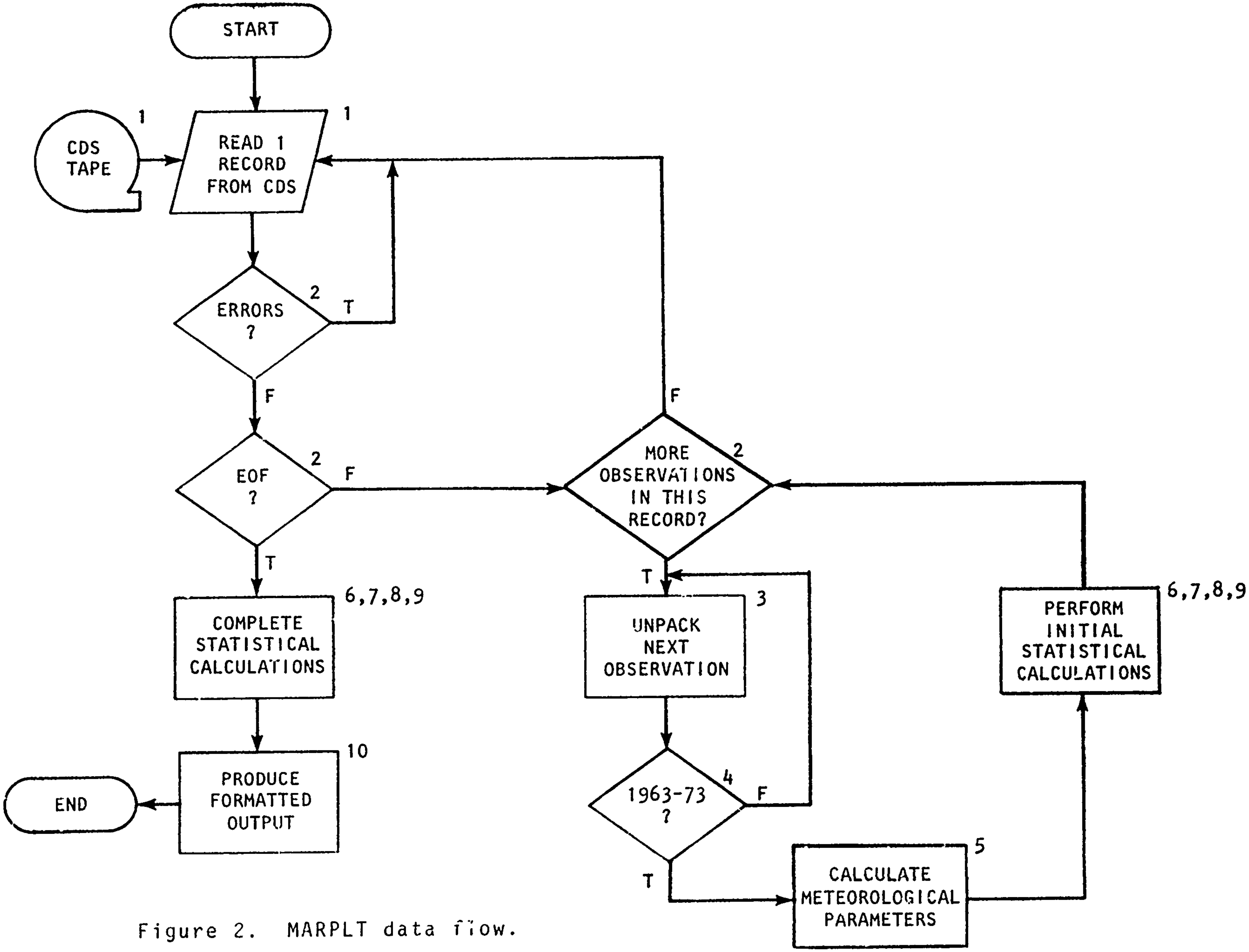

Figure 2. MARPLT data flow.

execution of each of the ten primary functions is given in the following sections. The parenthetical numbers following each heading indicate the relationship to the above functions.

3.3 DATA INPUT AND VERIFICATION (1,2)

A buffer input statement was used to transfer data from a file to a block of memory one record at a time. Then the status of the buffer input operation was checked for an EOF or parity error condition. If a parity error was noted the record was discarded. If an EOF was encountered, end-product statistics for the Marsden square were calculated. If no parity error or EOF was noted, the number of words in the record was determined. If the number of words was a multiple of 5, the packing arrangement of the record was acceptable. Otherwise, the record was discarded. Acceptable records were processed observation by observation. The above procedure was repeated until all observations for a Marsden square were analyzed and an EOF was encountered.

3.4 DATA DECODING (3)

Each observation was first unpacked from a binary form. Each observation was then checked for data source (SPOT or TDF-11). The appropriate scaling for pressure was applied depending on the data source. Air temperature, dew point and sea surface temperature were corrected for sign. Latitude and longitude were decoded with the convention that positive (negative) latitude was North (South). Positive (negative) longitude was east (west). The remaining data were decoded with scaling and bias factors described in MII (1975).

3.5 ANALYSIS PERIOD (4)

Only those observations taken during the eleven year period 1963-1973 were analyzed. Selection of the desired observations required a simple check that the year of the observation was within 5 years of 1968.

3.6 METEOROLOGICAL CALCULATIONS (5)

Visibility values were taken directly from the CDS tapes. The four remaining variables were calculated using correlation models and the reported weather data.

3.6.1 Rainrate

The rainrate was evaluated using the relation of the present weather code (IPW) to rainrate, originally derived by Tucker (1971) and subsequently modified by Bourke and Dorman (1977). These derivations were specifically derived to determine three hour precipitation totals, rather than rainrates. This work infers an average precipitation rate from the three hour total. It must be stressed that this rate is often less than the possible instantaneous rainrate within the three hour period of observation.

3.6.2 Molecular Extinction Coefficient

The molecular extinction coefficient was calculated for the thermal infrared wavelength band (8-12 μm). The extinction coefficient was calculated using a polynomial fit to the LOWTRAN 3B molecular transmittance code. In translating from transmittance to extinction a 10 km range was used to approximate the range dependence of the extinction coefficient.

3.6.3 MIRACL Spectrum Absorption Coefficient

Molecular absorption for the proposed MIRACL spectrum was evaluated using an algorithm developed by Science Applications, Inc. (SAI). The absorption coefficient for each observation was determined through the solution of a polynomial which is a function of water vapor pressure (Torr) and temperature (K) and has the following form:

$$f(T,P) = a_1 + a_2T + a_3P + a_4P^2 + a_5TP^2 + a_6TP + a_7T^2 + a_8PT^2 + a_9P^2T^2$$

where T is temperature and P is vapor pressure. Values for the coefficients a_i, i= 1,2,...,9 were determined by SAI using a least squares fitting procedure and are listed below:

$a_1 = 9.4351*10^{-2}$ $a_6 = -1.0417*10^{-3}$

$a_2 = -3.2344*10^{-4}$ $a_7 = 2.6804*10^{-7}$

$a_3 = 1.7890*10^{-1}$ $a_8 = 1.5392*10^{-6}$

$a_4 = 1.0080*10^{-3}$ $a_9 = 1.2311*10^{-8}$

$a_5 = -7.0357*10^{-6}$

The polynomial is valid for temperatures ranging from 240 K to 320 K and water vapor pressures from 0 to 79 Torr.

3.7 STATISTICAL CALCULATIONS (6,7,8,9)

The magnitude of the values calculated above was checked against specified limits. If these threshold values were met or exceeded the appropriate frequency of occurrence counters were incremented. Other counters recorded the number of observations for a given month and the number of observations for a given

Marsden subsquare. The computed values for the two attenuation coefficients were summed before calculating the mean and standard deviation of the coefficient data.

Data on the CDS tape are chronologically ordered within each Marsden subsquare. The processing described above continued until all observations for a given month, year and subsquare were analyzed. Then program control was transferred to the subroutine MNAVG. When program control was returned to the main program, the processing of observations for the next month but same year and subsquare was begun. (If observations from December were the last data analyzed, the month and year would have changed when program control reverted to the main program.)

After all observations for a given Marsden subsquare were processed, program control was transferred to the subroutine SUBAVG.

3.7.1 Monthly Averaging

The subroutine MNAVG grouped information by month and performed some analysis of the data accumulated in the main program. No end-product statistics were calculated in MNAVG. Values computed in MNAVG were based on observations from a single month, year and subsquare.

Using visibility as an example, the frequency of occurrence for a given month and year was calculated as follows:

$$FVIS1 = NVIS/NDMN$$

where:

FVIS1 is the frequency of occurrence of visibility ≤ 1 km for a given month,

NVIS	is the number of observations that had a reported visibility less than or equal to 1 km,
NDMN	is the total number of observations reported for the month.

The results of the calculations were identified by month and grouped with the results based on data from the same month of other years. (Recall that all of this data is from the same Marsden subsquare.) Newly computed values of frequency of occurrence were summed with previously computed values each time MNAVG was called. The summed totals for the two attenuation coefficients were similarly grouped by month and summed over the entire data analysis period.

3.7.2 Marsden Subsquare Averages

In the subroutine SUBAVG, the various summations computed in MNAVG were averaged to calculate the means and standard deviations of the attenuation coefficients and the mean frequencies of occurrence described previously. These statistics were grouped by month and subsquare. Using visibility as an example, the process was as follows:

$$FVIS2 = \frac{1}{N} \sum_{i=1}^{N} FVIS1_i$$

where:

FVIS2	is the mean frequency of occurrence of visibility ≤ 1 km in the subsquare for a given month over the entire analysis period,

$\sum_{i=1}^{n} FVIS1_i$ is the summation of the individual frequencies of occurrence computed for a given month and year,

N is the number of years that had reports for the given month and had a possible range of 0 to 11.

These mean subsquare values were then summed and eventually a mean value for the entire Marsden Square was calculated.

3.7.3 Marsden Square Averages

When all data for a Marsden Square had been processed, the program encountered an EOF. Program control was transferred to a different section of the main program and the summations of subsquare means were averaged to produce the required mean frequencies of occurrence fo the entire Marsden Square. Again using visibility as an example, the computations were done as follows:

$$FVIS3 = \frac{1}{N} \sum_{i=1}^{N} FVIS2_i$$

where:

$FVIS3$ is the mean frequency of occurrence of visibility $\leq$ 1 km in the Marsden Square for a given month over the entire analysis period,

$\sum_{i=1}^{N} FVIS2_i$ is the summation of the mean frequencies of occurrence of visibility $\leq$ 1 km in each subsquare with reports,

N is the number of subsquares that had reports during the analysis period.

The processing described in this and the preceeding sections can be summarized as follows:

* Monthly means were calculated for each E-O-met variable
* The monthly means were averaged to produce mean values for the subsquares
* The subsquare means were averaged to produce mean values that were grouped by montn but applied to the entire Marsden Square and analysis period.

This method of computing the average of means had the effect of limiting the bias introduced by years and subsquares that had many observations relative to others.

3.8 FORMATTED OUTPUT (10)

Output from the computer program included tables organized by month which listed the statistics described in previous sections. Table 2 is a sample of the tabular output. Histograms and graphs of cumulative frequency for the rainrate data were plotted as shown in Figure 3.

The output of MARPLT contained the mean latitude, mean longitude, standard deviation of the latitude and standard deviation of the longitude of the Marsden subsquares analyzed for each Marsden Square. Subsquares with no reports were identified by subsquare number. The number of subsquares with reports and the number of observations analyzed for the Marsden Square during the 1963-1973 period were given. The output also

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT.	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
145	7	45.1	2.9	-5.1	2.8	95	92561

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	91.5	3.9	1.2	1.3	.8	.1	.2	.8	.2	.0	.0	.0	.0	0.0	0.0	.1	.0	.0	.0	0.0	0.0
FEB	94.4	1.9	1.4	1.2	.2	.2	.3	.1	.1	.0	.0	0.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	95.1	1.3	2.4	.1	.6	.3	.0	.0	0.0	.2	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	94.7	1.5	2.8	.1	.3	.2	.3	.0	.0	0.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	96.8	.9	.8	.1	.6	.7	.0	0.0	.0	.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	98.3	1.2	.2	.1	.1	.0	.0	0.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	98.2	.7	.1	.8	.1	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	97.2	1.4	.7	.3	.1	.3	.0	.0	.0	.0	0.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	91.8	3.4	.8	.9	1.7	.2	.6	.1	.1	.0	.0	.5	.0	.0	0.0	.0	.0	0.0	.0	.0	0.0
OCT	94.1	2.3	.8	.9	.6	.1	.1	.1	.8	.0	.0	.0	.1	.0	.1	.0	.0	.0	0.0	0.0	0.0
NOV	90.4	3.7	.8	1.6	.5	.1	.2	.4	.7	.9	.0	.4	.1	.0	0.0	0.0	.0	0.0	0.0	0.0	0.0
DEC	89.7	4.1	.8	3.9	.2	.8	.1	.3	.1	.0	.0	.0	0.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	91.5	95.3	96.5	97.8	98.6	98.7	98.9	99.7	99.9	99.3	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0
FEB	94.4	96.4	97.7	99.0	99.2	99.4	99.7	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	95.1	96.4	98.8	98.9	99.5	99.8	99.8	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	94.7	96.2	99.0	99.1	99.4	99.6	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	96.8	97.6	98.5	98.5	99.2	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	98.3	99.5	99.7	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	98.2	99.0	99.1	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	97.2	98.5	99.3	99.6	99.6	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	91.8	95.2	96.0	96.9	98.5	98.8	99.3	99.4	99.4	99.5	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	94.1	96.4	97.2	98.1	98.7	98.8	98.9	99.0	99.8	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	90.4	94.1	95.0	96.6	97.1	97.2	97.4	97.8	98.5	99.4	99.4	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	89.7	93.8	94.7	98.4	98.6	99.4	99.5	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.21	.08	1.42	.76	1.18	.67	1.11	.54	.85	.65	.28	.32
DET >= 0.8	1.70	2.33	1.55	.94	.46	.66	.22	.43	3.15	1.40	4.12	1.99
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RNR >= 2.0	2.18	1.03	1.11	.88	1.45	.14	.11	.45	3.15	1.92	3.42	1.57

Table 2. Monthly climatological values for Marsden Square 145.

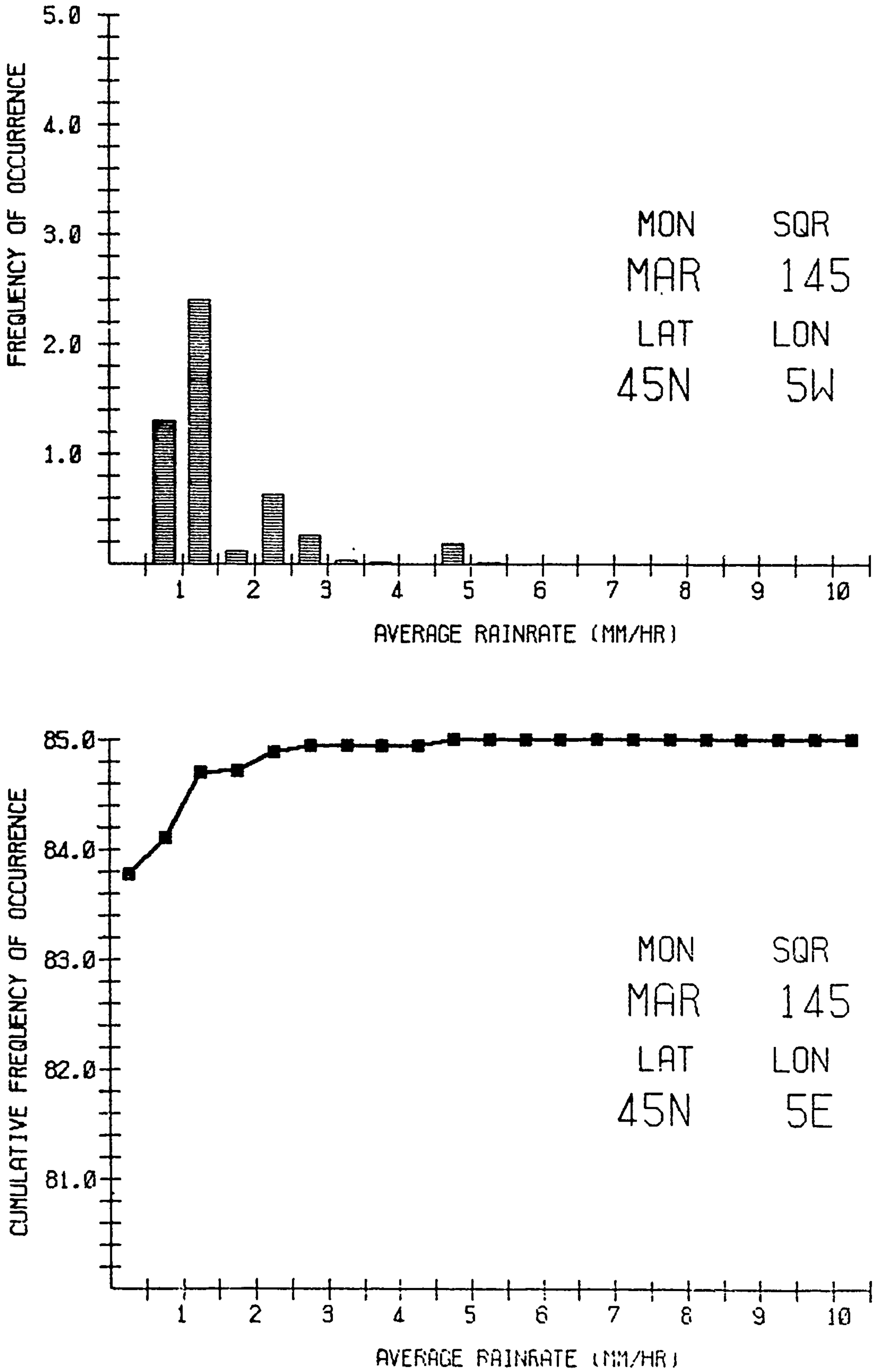

Figure 3. Frequency (top) and cumulative frequency (bottom) of occurrence of rainrates for March for Marsden Square 145.

listed the identifying number of each Marsden Square analyzed and the quadrant of the globe in which the square is located. All standard deviations were calculated using N weighting.

The subroutine HISTPLT contained the code used to produce the graphs on the Varian plotter. Extended Core Storage (ECS) was required for the plotting operation. The graphs were produced by a simple bin sort. A total of 21 intervals of rainrate were specified, ranging from 0 to greater than 10 mm/hr in 0.5 mm/hr increments. Referring to Figure 3(a), the histogram should be interpreted as the frequency of occurrence (percent) of rainrates falling into each interval. Reports were included in a bin when the observed rainrate was greater than or equal to the lower bin boundary value and less than the higher bin boundary. All observations of rainrate greater than or equal to 10 mm/hr were grouped together and displayed in the 21st interval. For this interval the histogram should be interpreted as the frequency of occurrence (percent) of rainrates greater than or equal to 10 mm/hr.

A variable vertical scale was used to provide maximum resolution of the displayed data. The three vertical scales incorporated into the program had maximums of 5, 10, and 20 percent. Data for the interval 0.0 to 0.5 mm/hr were not plotted since the overwhelming majority of observations fell into this category. Any attempt to plot on the same graph the data for all of the intervals would have lead to scaling problems and difficulty in using the plots. Values for the data associated with the first interval were listed in the tabular output.

The cumulative frequency of occurrence (percent) corresponding to a particular bin boundary value was derived by summing all bin elements less than the bin boundary value and dividing this sum by the total number of bin elements. Referring to Figure 3(b), the graph should be interpreted as the frequency (percent) with which a rainrate less than the indicated value was reported. Again, one of three vertical scales was used to enhance the useability of the graph.

4. RESULTS

The collected statistics of rainfall, detector total extinction coefficient and MIRACL molecular extinction are included in Appendix A. These are in the form described in Section 3.8. Within each geographical area statistics are provided for each month. In addition frequency statistics of visibility and rainrate exceeding their critical values are provided for each month.

Program listings of programs relating archived meteorological data to rainrates and extinction coefficients are provided in Appendix B.

5. CONCLUSIONS

The environmental conditions limiting use of a high energy laser system are basically high rain rate and low visibility. These conditions limit the use of the HEL system in all regions except Korea less than 6% of the time. In the Korean area, visibility is limited by frequent fog conditions. These low visibility conditions are less frequent in winter (below 2%) than in summer when they occur about 10% of the time.

The highest average rain rate limitation occurs in the tropical zones (for example S.E. Asia when rain limits laser use 5% of the time in November). We again stress the limitations of the rain rate algorithm however. The algorithm is accurate in northern latitudes which have long periods of relatively light rain. The tropics, however, often have short periods of very intense rain, exceeding 25 mm/hr. The averaging techniques used here "smears" such intense occurrences over an entire three hour period. An average rain of 3 mm/hr in three hours, may just as well mean that the entire rain fell in a half hour, and is characterized by a rain rate of 18 mm/hr for a short period.

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APPENDIX A
TABLES AND GRAPHS

The data in this appendix are presented in two groups: first, tables of rainrates and bad weather statistics; and second, paired graphs of rainrate frequencies of occurrence (top) and cumulative frequencies of occurrence (bottom). One table and eight graphs are included for each of the 14 Marsden Squares analyzed.

The graphs summarize their respective rainrate statistics for the months of March, June, September, and December, in that order. These months were chosen to represent the four climatic seasons of spring, summer, fall, and winter.

Within each of the two groups, tables/graphs are ordered by Marsden Square number in the sequence shown below.

Square	Geographic Area
102-103	Persian Gulf
67	Arabian Sea
26	Southeast Asia
131-132	Korea
200	Kamchatka Peninsula
44	Caribbean Sea
145-147	North Atlantic Ocean
252	Norway
143-144	Mediterranean Sea

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
102	1	22.9	1.9	64.6	2.7	57	8842

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	99.9	0.0	0.0	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	99.6	.3	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	99.9	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	99.2	0.0	.3	.3	0.0	.1	0.0	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	.1	0.0	0.0	0.0	0.0	0.0
JUL	95.3	.1	1.4	.2	.9	0.0	.1	1.2	.0	.5	.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	98.8	.1	.6	0.0	.1	0.0	.4	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	100.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCT	99.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOV	99.8	0.0	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC	99.3	.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	99.6	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	99.2	99.2	99.4	99.7	99.7	99.8	99.8	99.8	99.9	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0
JUL	95.3	95.5	96.8	97.0	97.9	97.9	97.9	99.1	99.2	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	98.8	98.8	99.4	99.4	99.5	99.5	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	99.8	99.8	99.8	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	99.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.10	0.00	0.00	0.00
DET >= 0.8	0.00	0.00	0.00	0.00	0.00	.65	2.85	.56	0.00	.08	.05	0.00
MIR >= .28	0.00	0.00	0.00	.17	1.12	.85	.70	.12	.48	.03	.15	0.00
RNR >= 2.L	.15	0.00	0.00	0.00	0.00	.25	3.03	.60	0.00	.88	.85	0.00

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
103	1	25.3	2.1	55.5	3.1	50	18726

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	98.0	.4	1.1	0.0	.2	.0	.1	0.0	0.0	0.0	.1	0.0	0.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	96.6	1.3	.9	.5	.1	.3	.0	0.0	.0	0.0	0.0	.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	99.4	.3	.1	.0	.0	0.0	.1	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	96.7	3.0	.1	.2	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	100.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	99.8	0.0	.1	.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	99.8	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCT	100.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOV	99.0	0.0	0.0	0.0	0.0	0.0	.5	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	.0	.3	.1	0.0	0.0	0.0
DEC	99.5	.3	0.0	0.0	0.0	0.0	0.0	0.0	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	98.0	98.4	99.4	99.4	99.7	99.7	99.8	99.8	99.8	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	96.6	97.9	98.7	99.3	99.3	99.7	99.7	99.7	99.7	99.7	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	99.4	99.7	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	96.7	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	99.0	99.0	99.0	99.0	99.0	99.0	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.6	99.9	100.0	100.0	100.0	100.0
DEC	99.5	99.8	99.8	99.8	99.8	99.8	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.02	.65	.01	.02	.41	.08	.12	.19	.11	.10	.01	.77
DET >= 0.8	.11	.49	.11	.23	0.00	.08	.55	.02	.33	0.00	.03	.17
MIR >= .28	0.00	0.00	.12	.07	2.25	3.12	10.80	10.20	7.28	.66	0.00	0.00
RNR >= 2.0	.56	.74	.10	.06	0.00	0.00	.03	0.00	0.00	0.00	1.01	.17

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
67	1	14.2	2.6	55.4	2.8	82	27159

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	99.8	0.0	.1	.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	98.9	.8	0.0	.1	0.0	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	99.9	.1	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	99.7	.1	.0	0.0	.1	.1	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	98.5	.6	.4	0.0	.0	.0	0.0	0.0	.1	0.0	.1	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	99.8	0.0	.1	.0	0.0	0.0	0.0	0.0	0.0	.1	0.0	0.0	0.0	.0	0.0	0.0	.0	0.0	0.0	0.0	0.0
JUL	100.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0
AUG	100.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	99.9	0.0	.0	.0	.0	0.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCT	98.7	0.0	.3	0.0	.0	.0	.3	.3	0.0	0.0	0.0	.0	.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOV	98.0	.1	1.2	.0	.3	.0	.3	0.0	0.0	.1	0.0	0.0	.0	.0	0.0	0.0	0.0	.0	.1	.0	0.0
DEC	99.2	.3	.1	0.0	.0	.0	.3	0.0	.0	.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	98.9	99.7	99.7	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	99.7	99.7	99.7	99.7	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	98.5	99.3	99.6	99.6	99.7	99.7	99.7	99.7	99.8	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	99.5	99.8	99.8	99.9	99.9	99.9	99.9	99.9	99.9	99.3	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	98.7	98.7	99.0	99.0	99.1	99.1	99.4	99.7	99.7	99.7	99.7	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	98.0	98.1	99.3	99.3	99.4	99.4	99.7	99.7	99.7	99.8	99.8	99.8	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0
DEC	99.2	99.5	99.6	99.6	99.6	99.6	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.01	.06	0.00	0.00	0.00	.03	.05	.14	.60	.38	.14	0.00
DET >= 0.8	.03	.15	0.00	.25	.27	.93	2.11	1.34	.06	.62	.54	.37
MIR >= .23	0.00	.04	.01	.05	.05	.33	1.90	.11	.29	.53	.01	0.00
RAR >= 2.0	.03	.26	0.00	.26	.35	.14	.01	0.00	.05	.96	.67	.44

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
26	1	5.2	2.8	105.2	2.8	92	52918

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	95.7	0.0	1.6	.8	.0	.3	.0	.0	1.2	.1	0.0	0.0	.0	.0	.0	.0	.1	.0	.0	.1	0.0
FEB	97.3	.4	1.1	.0	.2	.2	.3	.0	0.0	.0	0.0	.2	.1	0.0	0.0	.0	.0	0.0	0.0	0.0	0.0
MAR	96.6	2.2	.3	.6	.1	.0	.0	.1	0.0	0.0	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	97.9	1.1	.4	0.0	.3	0.0	.1	0.0	.0	0.0	0.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	95.8	2.4	.4	.1	.7	.0	.2	.0	.3	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	91.8	.0	2.6	.4	.7	1.5	.8	.4	1.0	.2	.1	.1	.1	.2	.0	.0	.1	.1	.0	.0	.0
JUL	93.0	.2	1.8	.1	1.2	1.0	.7	.4	.2	.2	.0	.4	.2	.1	.3	.0	.0	.0	.0	.0	.1
AUG	92.5	.3	3.2	.1	1.4	.6	.5	.1	.0	.1	.0	.4	.3	.2	.0	.0	.0	.0	.0	.0	0.0
SEP	91.7	0.0	3.7	.3	.7	1.4	.2	.3	.4	.1	.1	.2	.0	.0	.1	.2	.2	.2	.0	.0	.1
OCT	89.5	0.0	4.2	.0	1.5	.1	2.6	.9	.2	.2	.3	.0	.0	.2	.2	.0	0.0	0.0	.1	0.0	.0
NOV	89.3	0.0	4.1	.1	1.7	.1	2.1	.5	.0	.6	.2	0.0	.3	.3	.0	0.0	.1	.0	.2	.1	.1
DEC	90.4	.1	4.7	1.3	.6	.0	1.2	.1	.0	.2	0.0	.1	.6	.2	.0	0.0	.1	.4	.1	0.0	.1

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	95.7	95.7	97.4	98.2	98.2	98.4	98.5	98.5	99.7	99.7	99.7	99.7	99.7	99.8	99.8	99.8	99.9	99.9	99.9	100.0	100.0
FEB	97.3	97.7	98.8	98.9	99.1	99.3	99.6	99.6	99.6	99.6	99.6	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	96.6	98.8	99.1	99.7	99.7	99.7	99.7	99.8	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	97.9	99.0	99.5	99.5	99.8	99.8	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	95.8	98.2	98.6	98.7	99.4	99.4	99.7	99.7	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	91.8	91.8	94.4	94.8	95.5	97.0	97.7	98.2	99.1	99.3	99.4	99.5	99.6	99.8	99.8	99.8	99.9	99.9	100.0	100.0	100.0
JUL	93.0	93.2	95.0	95.2	96.3	97.3	98.0	98.4	98.6	98.8	98.9	99.3	99.5	99.6	99.8	99.9	99.9	99.9	99.9	99.9	100.0
AUG	92.5	92.7	95.9	96.0	97.4	98.0	98.5	98.7	98.7	98.8	98.9	99.3	99.7	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0
SEP	91.7	91.7	95.4	95.7	96.4	97.8	98.0	98.3	98.7	98.8	98.9	99.1	99.1	99.1	99.3	99.5	99.6	99.8	99.9	99.9	100.0
OCT	89.5	89.5	93.6	93.6	95.1	95.2	97.8	98.7	98.9	99.1	99.4	99.4	99.5	99.7	99.8	99.9	99.9	99.9	100.0	100.0	100.0
NOV	89.3	89.3	93.4	93.5	95.2	95.3	97.4	97.9	97.9	98.5	98.7	98.7	99.0	99.3	99.4	99.4	99.5	99.6	99.8	99.9	100.0
DEC	90.4	90.4	95.1	96.4	97.0	97.1	98.2	98.3	98.3	98.5	98.5	98.6	99.2	99.4	99.4	99.4	99.5	99.8	99.9	99.9	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.08	.08	.32	.01	.27	.20	.16	.23	.02	.84	.18	.45
DET >= 0.8	1.63	.89	.90	.49	1.32	2.79	3.48	2.02	2.09	4.72	4.24	2.54
MIR >= .28	.15	.02	.27	.64	.93	.20	.16	.35	.04	.27	.86	.88
RNR >= 2.0	1.84	1.13	.33	.52	1.34	5.20	4.84	3.97	4.34	6.36	6.50	3.56

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
131	1	34.9	2.9	134.9	2.9	99	51036

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	92.9	4.5	1.0	.3	.7	.1	.0	.1	.1	.1	.1	.0	0.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	93.7	3.7	1.2	.4	.3	.3	.1	.2	.1	.0	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	94.1	3.5	.8	.1	1.1	.2	.0	.0	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	90.5	5.0	2.0	.7	.4	.5	.5	.3	0.0	.0	.0	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	91.0	3.2	2.8	.7	.1	.4	.8	.6	.0	.1	.1	.0	0.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	91.3	2.8	1.5	1.8	.4	.4	.2	.2	.3	.6	.2	.2	.2	.1	.0	.0	.0	0.0	.0	0.0	.0
JUL	92.8	1.6	2.2	1.1	.4	.2	.3	.2	.2	.5	.2	.0	.1	.0	0.0	.0	.0	.0	.0	.0	.0
AUG	95.8	.8	1.4	.5	.2	.2	.1	.1	.1	.1	.1	.2	.0	.1	.1	.0	.0	.0	.0	.0	.0
SEP	89.4	3.3	2.3	1.1	.6	.2	.5	.4	.5	.4	.3	.3	.1	.2	.0	.0	.1	.0	.1	.0	.4
OCT	94.0	2.2	.9	.8	.4	.3	.5	.1	.1	.2	.3	.1	.0	.0	.0	.0	.0	.0	.0	.0	0.0
NOV	93.5	1.9	1.6	.8	.1	.3	.2	.1	.3	.0	.7	.1	.0	.2	0.0	.1	.0	.0	0.0	0.0	0.0
DEC	92.6	3.5	2.1	.6	.4	.1	.1	.1	.1	.1	.1	.0	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	92.9	97.3	98.4	98.7	99.5	99.6	99.6	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	93.7	97.3	98.5	98.9	99.2	99.5	99.6	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	94.1	97.7	98.5	98.6	99.7	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	90.5	95.5	97.5	98.2	98.5	99.1	99.6	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	91.0	94.2	97.0	97.8	97.9	98.2	99.1	99.7	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	91.3	94.1	95.5	97.3	97.7	98.1	98.2	98.4	98.7	99.3	99.5	99.7	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0
JUL	92.8	94.4	96.6	97.7	98.2	98.4	98.7	98.9	99.0	99.6	99.7	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0
AUG	95.8	96.7	98.1	98.5	98.8	99.0	99.1	99.2	99.3	99.4	99.5	99.6	99.7	99.7	99.8	99.9	99.9	99.9	100.0	100.0	100.0
SEP	89.4	92.7	95.0	96.1	96.7	96.8	97.3	97.7	98.2	98.6	98.8	99.1	99.2	99.4	99.5	99.5	99.5	99.6	99.6	99.6	100.0
OCT	94.0	96.2	97.1	97.9	98.3	98.6	99.0	99.1	99.2	99.3	99.7	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0
NOV	93.5	95.4	97.0	97.8	98.0	98.3	98.4	98.6	98.9	98.9	99.6	99.7	99.7	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0
DEC	92.6	96.1	98.2	98.9	99.3	99.5	99.5	99.6	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	1.23	.66	.65	1.36	2.47	1.57	1.86	.29	.22	.14	.42	.82
DET >= 0.6	.50	.80	.53	1.46	1.74	2.24	2.20	1.29	3.10	1.73	1.69	.61
MIR >= .28	0.00	0.00	0.00	0.00	0.00	.05	.43	.07	.01	0.00	0.00	0.00
RNR >= 2.0	1.29	1.08	1.39	1.85	2.24	2.71	2.25	1.49	3.92	2.07	2.15	1.12

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
132	1	34.6	2.7	124.9	3.0	88	12495

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	96.1	1.5	.9	.7	.1	0.0	.2	.4	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	96.5	1.8	.5	.4	.1	.1	.5	.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	94.9	2.2	1.0	0.0	1.5	.4	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	93.6	3.1	1.1	.5	.6	.7	.3	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	94.2	2.3	1.7	.5	0.0	.8	.1	.1	0.0	0.0	0.0	.0	.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	92.9	3.8	.9	.7	.3	.2	.0	.1	.0	.3	.5	.1	.1	.0	0.0	.1	.0	0.0	0.0	0.0	0.0
JUL	92.7	2.2	.7	1.9	.4	.1	.5	.1	.6	.0	.5	.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0
AUG	92.5	.8	2.3	.9	2.1	.6	.1	.1	0.0	.2	.3	0.0	.1	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0
SEP	94.2	.7	1.7	.3	.6	.7	.9	.2	.0	.5	.0	.1	.1	0.0	0.0	0.0	0.0	.1	0.0	0.0	.1
OCT	92.5	4.5	.1	2.1	.2	.1	.1	.0	.1	.0	.0	.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOV	96.6	1.8	.2	.5	.1	.2	0.0	.0	.2	.0	.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC	94.3	3.4	1.2	.3	.1	.0	0.0	0.0	.1	.1	0.0	.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	96.1	97.6	98.5	99.2	99.3	99.3	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	96.5	98.3	98.8	99.2	99.2	99.4	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	94.9	97.1	98.1	98.1	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	93.6	96.7	97.8	98.3	98.8	99.5	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	94.2	96.6	98.3	98.8	98.8	99.6	99.6	99.7	99.7	99.7	99.7	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	92.9	96.6	97.5	98.2	98.5	98.7	98.7	98.8	98.9	99.2	99.7	99.7	99.8	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0
JUL	92.7	95.0	95.7	97.6	98.0	98.2	98.7	98.8	99.4	99.4	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	92.5	93.3	95.6	96.5	98.5	99.1	99.2	99.3	99.3	99.5	99.8	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	94.2	94.8	96.5	96.8	97.4	98.0	98.9	99.1	99.1	99.6	99.6	99.7	99.8	99.8	99.8	99.8	99.8	99.9	99.9	99.9	100.0
OCT	92.5	97.1	97.1	99.2	99.4	99.5	99.6	99.6	99.7	99.7	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	96.6	98.4	98.6	99.1	99.2	99.4	99.4	99.4	99.6	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	94.3	97.7	98.9	99.2	99.3	99.3	99.3	99.3	99.4	99.5	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.32	.49	2.76	3.84	8.42	18.43	7.40	.40	2.24	.21	0.08	.14
DET >= 0.8	1.86	.11	.19	.92	.32	1.20	3.07	3.53	1.52	.36	.60	.20
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.80	0.00	.32	0.00	0.00	0.00	0.00
RNR >= 2.0	.76	.83	1.94	1.23	1.25	1.78	2.38	3.52	3.24	.78	.85	.83

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
200	1	54.4	2.8	165.5	2.7	86	6859

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	98.3	1.3	.3	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	97.3	0.0	.5	1.5	.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	94.1	2.8	.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	92.4	1.7	5.5	0.0	.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	92.6	2.6	3.6	.3	.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	97.4	1.0	1.3	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	98.3	.6	.0	.1	.4	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	98.5	.7	.6	.0	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	92.4	4.6	.4	1.4	1.1	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCT	95.9	1.9	1.3	.1	.5	.1	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOV	92.3	2.0	2.6	0.0	2.6	.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC	86.7	5.3	2.5	1.5	.6	2.5	.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	98.3	99.5	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	97.3	97.3	97.8	99.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	94.1	97.0	97.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	92.4	94.1	99.5	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	92.6	95.1	98.8	99.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	97.4	98.5	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	98.3	99.0	99.6	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	98.5	99.3	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	92.4	97.0	97.4	98.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	95.9	97.8	99.1	99.2	99.7	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	92.3	94.2	96.9	96.9	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	86.7	92.5	95.0	96.5	97.1	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.96	.98	1.35	15.25	16.17	12.93	22.58	17.45	2.35	2.11	2.75	5.12
DET >= 0.8	2.58	5.00	1.93	1.14	2.75	1.35	.23	.19	.16	2.66	3.16	3.60
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RNR >= 2.0	0.00	.74	0.00	.45	.88	0.00	.38	.11	1.17	.80	3.15	3.54

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
44	7	15.0	2.9	-74.9	2.9	100	93949

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	98.1	0.0	.4	.1	.1	.1	0.0	.2	.5	.3	.0	.0	.1	0.0	.0	.0	.0	0.0	0.0	0.0	0.0
FEB	97.9	.8	.7	.0	.0	.3	.1	0.0	.0	0.0	0.0	.1	0.0	0.0	.0	.0	.0	0.0	0.0	0.0	0.0
MAR	98.9	.6	.0	.4	.0	.0	0.0	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	98.9	.6	.0	.0	.4	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	97.5	1.5	.2	.1	.4	.0	.0	.0	.1	.1	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	97.5	0.0	1.0	.3	.1	.1	.1	.2	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
JUL	97.6	.0	.6	.0	.7	.0	.0	.1	.2	.4	.1	.1	.1	.0	.0	.0	.0	0.0	.0	.0	.0
AUG	98.0	.1	.7	.1	.1	.1	.2	.2	.1	.1	.1	.0	.0	.0	.0	.1	.0	.0	0.0	0.0	0.0
SEP	96.5	0.0	1.3	.2	.1	.4	.0	.3	.4	.1	.0	.1	.0	.0	.1	.1	.2	.1	.0	.0	.1
OCT	94.9	0.0	1.9	0.0	.3	.3	.4	1.0	.2	.1	.1	.1	.1	.3	0.0	.1	.1	.1	.1	.0	.1
NOV	94.6	.0	2.3	0.0	.6	.0	1.2	.6	0.0	.1	.1	0.0	.0	.2	.0	.0	.0	.0	.0	.1	.0
DEC	97.3	.1	1.4	.0	.1	.0	.7	.1	.1	.2	0.0	.0	.1	.0	.0	0.0	0.0	.0	.0	.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	98.1	98.1	98.5	98.7	98.7	98.8	98.8	99.0	99.5	99.8	99.8	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0
FEB	97.9	98.6	99.4	99.4	99.4	99.8	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	98.9	99.5	99.5	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	98.9	99.5	99.6	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	97.5	99.0	99.2	99.3	99.8	99.8	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	97.5	97.5	98.5	98.6	98.9	99.0	99.1	99.4	99.6	99.7	99.7	99.7	99.8	99.8	99.8	99.9	99.9	99.9	99.9	99.9	100.0
JUL	97.6	97.6	98.2	98.2	98.9	98.9	99.0	99.1	99.2	99.6	99.7	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	98.0	98.0	98.7	98.8	98.9	99.1	99.3	99.5	99.6	99.7	99.8	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0
SEP	96.5	96.5	97.8	98.0	98.1	98.5	98.6	98.9	99.2	99.3	99.3	99.4	99.5	99.5	99.6	99.7	99.8	99.9	99.9	99.9	100.0
OCT	94.9	94.9	96.9	96.9	97.2	97.5	97.9	98.8	99.0	99.1	99.1	99.2	99.3	99.6	99.6	99.7	99.7	99.8	99.9	99.9	100.0
NOV	94.6	94.7	96.9	96.9	97.6	97.6	98.8	99.4	99.4	99.5	99.5	99.5	99.6	99.8	99.8	99.8	99.9	99.9	99.9	100.0	100.0
DEC	97.3	97.4	98.7	98.7	98.8	98.8	99.5	99.6	99.7	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.11	.01	.01	.02	0.00	.07	.06	.03	.08	.26	.19	.05
DLT >= 0.8	1.18	.62	.58	.44	.75	.83	.97	.99	1.22	2.26	2.23	1.18
MIR >= .28	.01	.06	.01	.04	.18	.09	.45	.34	.23	.16	.15	.27
RNR >= 2.0	1.35	.58	.11	.42	.67	1.21	1.81	1.16	1.96	3.13	3.06	1.26

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
145	7	45.1	2.9	-5.1	2.3	95	92561

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	91.5	3.9	1.2	1.3	.8	.1	.2	.8	.2	.0	.0	.0	.0	0.0	0.0	.1	.0	.0	.0	0.0	0.0
FEB	94.4	1.9	1.4	1.2	.2	.2	.3	.1	.1	.0	.0	0.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	95.1	1.3	2.4	.1	.6	.3	.0	.0	0.0	.2	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	94.7	1.5	2.8	.1	.3	.2	.3	.0	.0	0.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	96.8	.9	.3	.1	.6	.7	.0	0.0	.0	.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	98.3	1.2	.2	.1	.1	.0	.0	0.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	98.2	.7	.1	.8	.1	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	97.2	1.4	.7	.3	.1	.3	.8	.0	.0	.0	0.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	91.8	3.4	.8	.9	1.7	.2	.6	.1	.1	.0	.0	.5	.0	.0	0.0	.0	.0	0.0	.0	.0	0.0
OCT	94.1	2.3	.8	.9	.6	.1	.1	.1	.8	.0	.0	.0	.1	.0	.1	.0	.0	.0	0.0	0.0	0.0
NOV	90.4	3.7	.8	1.6	.5	.1	.2	.4	.7	.9	.0	.4	.1	.0	0.0	0.0	.0	0.0	0.0	0.0	0.0
DEC	89.7	4.1	.8	3.5	.2	.8	.1	.3	.1	.0	.0	.0	0.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

JAN	91.5	95.3	96.5	97.8	98.6	98.7	98.9	99.7	99.9	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0
FEB	94.4	96.4	97.7	99.0	99.2	99.4	99.7	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	95.1	96.4	98.8	98.9	99.5	99.8	99.8	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	94.7	96.2	99.0	99.1	99.4	99.6	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	96.8	97.6	98.5	98.5	99.2	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	98.3	99.5	99.7	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	98.2	99.0	99.1	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	97.2	98.5	99.3	99.6	99.6	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	91.8	95.2	96.0	96.9	98.5	98.8	99.3	99.4	99.4	99.5	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	94.1	96.4	97.2	98.1	98.7	98.8	98.9	99.0	99.8	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	90.4	94.1	95.0	96.6	97.1	97.2	97.4	97.8	98.5	99.4	99.4	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	89.7	93.8	94.7	98.4	98.6	99.4	99.5	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.21	.08	1.42	.76	1.18	.67	1.11	.54	.85	.65	.28	.32
DET >= 0.8	1.70	2.33	1.55	.94	.46	.66	.22	.43	3.15	1.40	4.12	1.99
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
RNR >= 2.0	2.18	1.03	1.11	.88	1.45	.14	.11	.45	3.15	1.92	3.42	1.57

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
146	7	44.9	2.9	-15.9	7.6	103	101530

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	90.0	4.1	1.6	1.7	1.3	.4	.2	.3	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	0.0
FEB	90.1	3.8	1.8	2.0	.4	.7	.5	.4	.1	.1	.0	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	95.9	1.1	1.7	.2	.3	.5	.1	.1	.0	.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	95.5	1.6	1.7	.2	.1	.6	.2	.0	.0	.0	.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	96.6	1.3	1.0	.2	.2	.4	.1	.1	0.0	0.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	98.0	1.1	.5	.2	.1	.1	.0	.0	.0	0.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	98.0	1.1	.4	.2	.1	.0	.0	.1	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	96.3	1.8	.9	.6	.1	.2	.1	.0	.0	0.0	0.0	0.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	93.8	3.2	.9	.6	.5	.2	.2	.1	.2	.1	.0	.0	.0	.0	.0	0.0	.0	.0	.1	.1	0.0
OCT	92.6	3.5	1.3	1.0	.4	.2	.2	.1	.2	.1	.2	0.0	.0	.0	.0	0.0	0.0	.0	0.0	0.0	0.0
NOV	91.0	4.3	1.1	1.4	.9	.4	.2	.3	.3	.0	.1	.1	.0	.0	.0	.0	.0	.0	0.0	0.0	0.0
DEC	91.8	4.1	.8	1.6	.6	.2	.1	.6	.3	.1	.0	0.0	.0	0.0	.0	.0	0.0	.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	90.0	94.1	95.7	97.4	98.7	99.1	99.2	99.5	99.8	99.8	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0
FEB	90.1	94.0	95.8	97.8	98.2	98.9	99.4	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	95.9	97.0	98.7	98.9	99.3	99.8	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	95.5	97.1	98.9	99.0	99.1	99.7	99.8	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	96.6	97.9	98.9	99.2	99.4	99.7	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	98.0	99.1	99.6	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	98.0	99.1	99.6	99.7	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	96.3	98.1	99.0	99.5	99.6	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	93.8	97.1	97.9	98.5	99.0	99.2	99.4	99.5	99.7	99.8	99.8	99.8	99.8	99.8	99.8	99.8	99.9	99.9	99.9	100.0	100.0
OCT	92.6	96.3	97.6	98.5	99.0	99.2	99.3	99.5	99.7	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	91.0	95.3	96.3	97.7	98.6	98.9	99.1	99.4	99.8	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	91.8	95.9	96.6	98.2	98.8	99.0	99.1	99.6	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.28	.18	.27	.48	.80	1.14	1.09	.59	.62	.45	.33	.34
DET >= 0.8	3.80	3.22	2.15	1.46	.86	.51	.29	.98	1.21	1.89	2.22	2.42
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RNR >= 2.0	2.59	2.16	1.06	.96	.82	.22	.26	.47	1.48	1.47	2.29	1.79

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
147	7	44.9	2.9	-24.9	2.9	100	84225

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	87.5	4.8	1.8	2.2	1.7	.4	.3	.3	.3	.3	.1	.1	.1	.1	.0	.0	.1	.0	0.0	.0	.0
FEB	91.0	4.0	1.8	1.6	.4	.4	.3	.3	.1	.0	.1	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	95.1	1.5	1.8	.4	.5	.5	.1	.1	.0	.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	95.4	1.4	1.7	.4	.2	.5	.2	.1	.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	95.8	1.7	1.4	.1	.3	.4	.0	.0	.0	.0	.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	96.1	2.1	.8	.3	.1	.3	.1	.1	.0	.0	0.0	.1	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	97.3	1.2	.6	.3	.1	.1	.0	.0	.1	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	95.3	2.6	.7	.6	.3	.2	.1	.1	.1	.0	0.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	93.4	3.0	1.2	.7	.5	.3	.2	.1	.1	.2	.1	.0	.0	.0	.1	.0	.0	0.0	0.0	0.0	.0
OCT	92.1	3.9	.9	1.0	.7	.2	.2	.3	.2	.1	.1	.1	.0	.0	.0	.0	0.0	.0	.0	.0	0.0
NOV	90.1	4.2	1.1	1.4	1.4	.3	.3	.3	.2	.3	.1	.1	.1	.0	0.0	.0	.1	.0	.0	0.0	.0
DEC	91.4	4.7	1.7	.9	.4	.1	.2	.3	.3	.0	.0	.0	0.0	.0	.0	.0	.0	.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

JAN	87.5	92.3	94.1	96.3	98.0	98.4	98.7	98.9	99.2	99.5	99.6	99.7	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0
FEB	91.0	95.0	96.8	98.3	98.7	99.1	99.4	99.7	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	95.1	96.5	98.3	98.7	99.1	99.6	99.7	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	95.4	96.8	98.5	98.9	99.1	99.6	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	95.8	97.5	98.9	99.0	99.4	99.8	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	96.1	98.2	99.0	99.3	99.4	99.7	99.8	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	97.3	98.6	99.2	99.5	99.6	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	95.3	97.9	98.6	99.1	99.4	99.6	99.8	99.9	99.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	93.4	96.4	97.6	98.3	98.8	99.1	99.3	99.4	99.4	99.7	99.8	99.8	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0
OCT	92.1	96.0	96.9	97.9	98.5	98.8	99.0	99.3	99.6	99.7	99.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	90.1	94.3	95.4	96.8	98.2	98.5	98.8	99.1	99.4	99.7	99.8	99.8	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0
DEC	91.4	96.0	97.7	98.6	99.0	99.1	99.3	99.6	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.27	.17	.28	.75	1.02	2.47	2.33	1.26	1.25	.83	.52	.61
DET >= 0.8	4.30	3.39	2.48	2.08	1.14	1.06	.60	1.17	1.54	2.66	3.97	1.87
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RNR >= 2.0	3.66	1.68	1.31	1.06	.97	.70	.47	.86	1.72	2.15	3.19	1.37

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
252	1	65.2	2.8	4.6	2.8	92	23909

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	81.5	1.7	5.3	3.2	1.6	2.3	2.1	0.0	2.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	88.8	1.9	6.9	.2	1.8	.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	88.1	6.0	3.3	1.3	1.1	.1	0.0	.1	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	94.5	2.6	1.3	.9	.7	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	97.4	2.0	.1	.4	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	94.5	4.5	.9	.1	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	97.0	1.8	1.1	.0	.1	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	97.9	1.8	.1	.1	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	89.3	6.2	2.6	1.4	.3	.3	.0	0.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCT	93.4	3.1	1.9	.1	1.0	.5	0.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOV	93.2	2.0	2.3	.1	1.0	1.1	.2	.0	0.0	0.0	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC	88.6	2.2	3.9	.8	2.7	1.3	.2	.0	0.0	0.0	.2	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

JAN	81.5	83.3	88.6	91.8	93.4	95.8	97.9	97.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	88.8	90.7	97.6	97.9	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	88.1	94.1	97.4	98.7	99.7	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	94.5	97.1	98.4	99.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	97.4	99.4	99.5	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	94.5	99.0	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	97.0	98.8	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	97.9	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	89.3	95.4	98.0	99.4	99.6	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	93.4	96.5	98.4	98.5	99.5	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	93.2	95.2	97.5	97.6	98.6	99.7	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	88.6	90.9	94.8	95.6	98.2	99.5	99.7	99.8	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	3.45	2.02	1.09	1.03	1.86	1.63	3.24	2.42	1.48	.59	.17	4.79
DET >= 0.8	7.65	1.68	2.54	1.81	.35	.13	.69	.21	1.22	2.23	3.12	5.52
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RNR >= 2.0	8.17	2.12	1.31	.75	.11	.01	.12	.06	.63	1.54	2.37	4.42

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD L	MEAN LON	SD LON	SUBSQUARES	OBSERVATIONS
143	1	35.5	2..	15.2	2.9	89	46817

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	94.1	3.6	.4	.5	.7	.2	.0	.1	.0	.2	.0	0.0	.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0
FEB	94.9	2.1	1.3	.9	.3	.2	.3	.1	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	98.6	.6	.3	.0	.0	.4	.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	97.3	1.7	.7	.1	0.0	.1	.0	.1	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	99.1	.5	.1	.3	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	99.4	.1	.3	.1	.1	0.0	0.0	0.0	0.0	.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUL	100.0	.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	99.3	.5	.0	.1	0.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	97.8	.3	.9	.1	.4	.0	.2	0.0	0.0	.0	0.0	.2	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCT	96.4	1.2	.1	.5	.6	.5	.2	.0	.3	.0	.1	.0	.0	.0	0.0	.0	.0	0.0	0.0	0.0	0.0
NOV	96.7	1.9	.1	.2	.4	.1	.0	.0	.4	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC	93.1	1.8	1.0	1.4	.8	.4	.1	.3	1.1	.0	0.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	94.1	97.7	98.1	98.6	99.3	99.5	99.5	99.7	99.7	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	94.9	97.0	98.2	99.1	99.4	99.6	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	98.6	99.2	99.5	99.6	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	97.3	99.0	99.7	99.8	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	99.1	99.6	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	99.4	99.5	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	99.3	99.7	99.7	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	97.8	98.1	98.9	99.0	99.5	99.5	99.7	99.7	99.7	99.7	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	96.4	97.6	97.7	98.2	98.8	99.3	99.5	99.5	99.7	99.8	99.9	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0
NOV	96.7	98.6	98.7	98.9	99.4	99.5	99.5	99.5	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	93.1	95.0	96.0	97.4	98.2	98.5	98.6	98.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.02	.08	.18	.10	.23	.03	.06	.04	.18	.04	.01	0.00
DET >= 0.8	.59	.65	.44	.23	.16	.28	.02	.11	.45	1.26	.65	.97
MIR >= .28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.19	0.00	0.00	0.00	0.00
RNR >= 2.0	1.40	.91	.42	.23	.03	.08	.02	.11	.96	1.84	1.06	2.64

MARSDEN SQUARE	QUADRANT	MEAN LAT	SD LAT	MEAN LON	SD LON	SUDSQUARES	OBSERVATIONS
144	1	36.8	2.2	4.9	2.9	58	54721

DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)

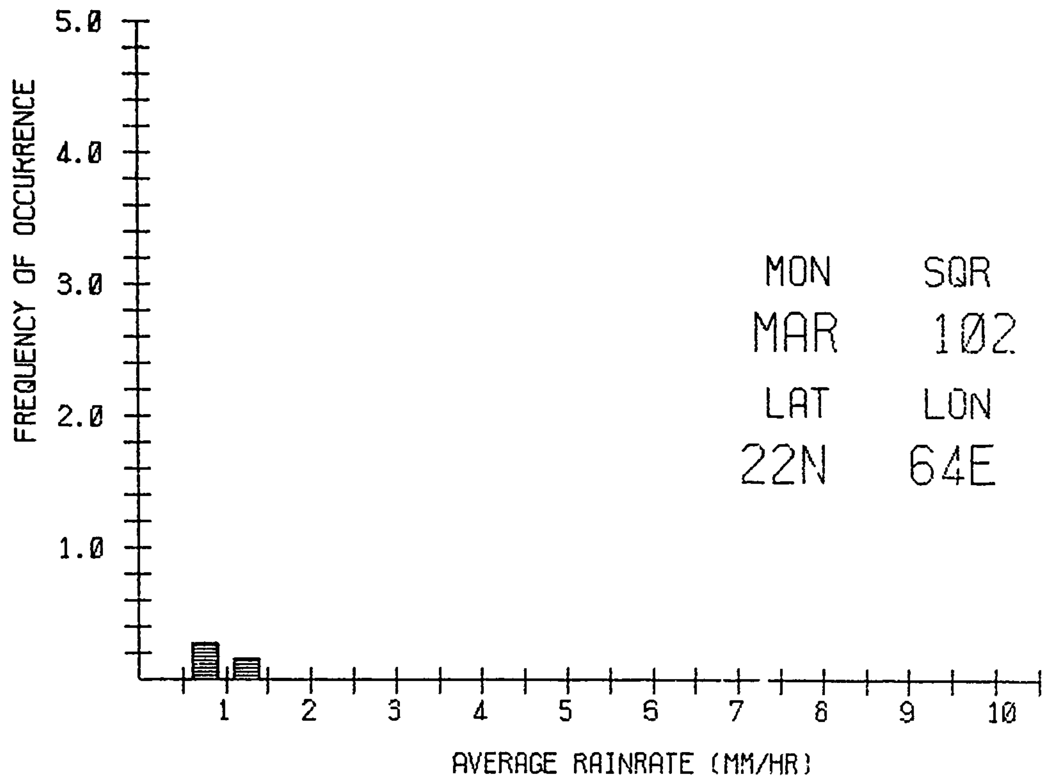
MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	96.0	1.9	.4	.5	.3	.1	.0	.2	.1	.4	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEB	96.5	1.7	.9	.5	.1	.1	.1	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAR	98.2	.7	.8	.1	.0	.0	.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
APR	95.1	4.0	.5	.1	.0	.2	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAY	98.3	.8	.4	.3	.0	.1	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUN	98.5	1.1	.2	.0	.2	.0	0.0	0.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	.0	0.0	0.0	.0	0.0	0.0
JUL	99.7	.2	.0	0.0	0.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG	99.3	.5	.1	.0	0.0	0.0	.0	0.0	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SEP	97.5	1.5	.2	.1	.1	.3	.1	.1	.1	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCT	97.6	1.4	.1	.1	.3	.2	.1	.0	0.0	.1	.0	.0	0.0	.0	0.0	.0	0.0	0.0	0.0	0.0	0.0
NOV	96.2	1.5	.2	.6	.7	.1	.1	.1	.5	.0	.0	.0	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC	94.7	2.2	1.2	1.0	.3	.1	.3	.1	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RAINRATE CUMULATIVE FREQUENCIES (PERCENT)

MONTH	<0.5	<1.0	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0	<4.5	<5.0	<5.5	<6.0	<6.5	<7.0	<7.5	<8.0	<8.5	<9.0	<9.5	<10.0	>=10.0
JAN	96.0	97.9	98.3	98.8	99.1	99.2	99.2	99.4	99.5	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
FEB	96.5	98.2	99.1	99.6	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAR	98.2	98.9	99.7	99.8	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APR	95.1	99.1	99.5	99.7	99.7	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MAY	98.3	99.1	99.5	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUN	98.5	99.6	99.8	99.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
JUL	99.7	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AUG	99.3	99.8	99.8	99.8	99.8	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEP	97.5	99.1	99.3	99.3	99.5	99.7	99.8	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OCT	97.6	98.9	99.0	99.1	99.5	99.7	99.8	99.8	99.8	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NOV	96.2	97.7	97.8	98.4	99.1	99.2	99.2	99.3	99.9	99.9	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DEC	94.7	96.9	98.1	99.1	99.4	99.5	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR, MIRACL AND RAINRATE PARAMETERS (PERCENT)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
VIS <= 1.0	.05	.06	.03	.16	.22	.21	.13	.15	.03	1.16	0.00	.05
DET >= 0.8	.64	.3	.47	.17	.16	.17	.08	.15	.34	.48	.46	.67
MIR >= .28	0.00	0.00	0.00	0.00	0.00	.04	.08	.04	.07	0.00	0.00	0.00
RNR >= 2.0	1.21	.38	.20	.31	.19	.21	.03	.15	.67	.86	1.59	.92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MON SQR
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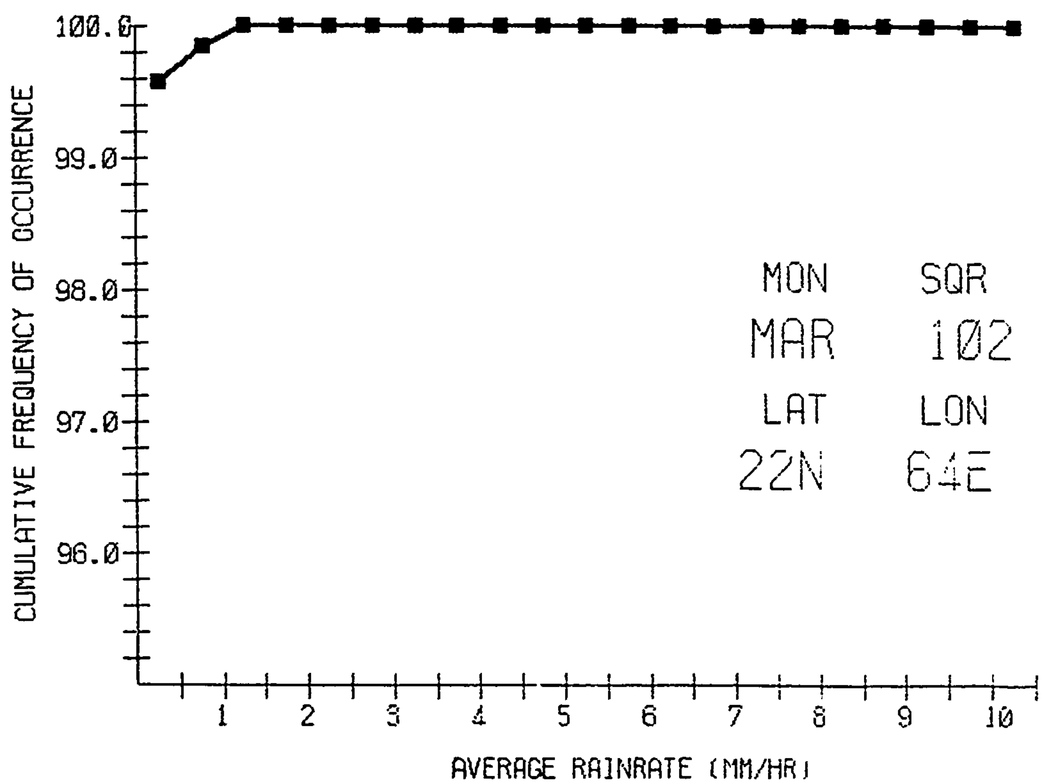
AVERAGE RAINRATE (MM/HR)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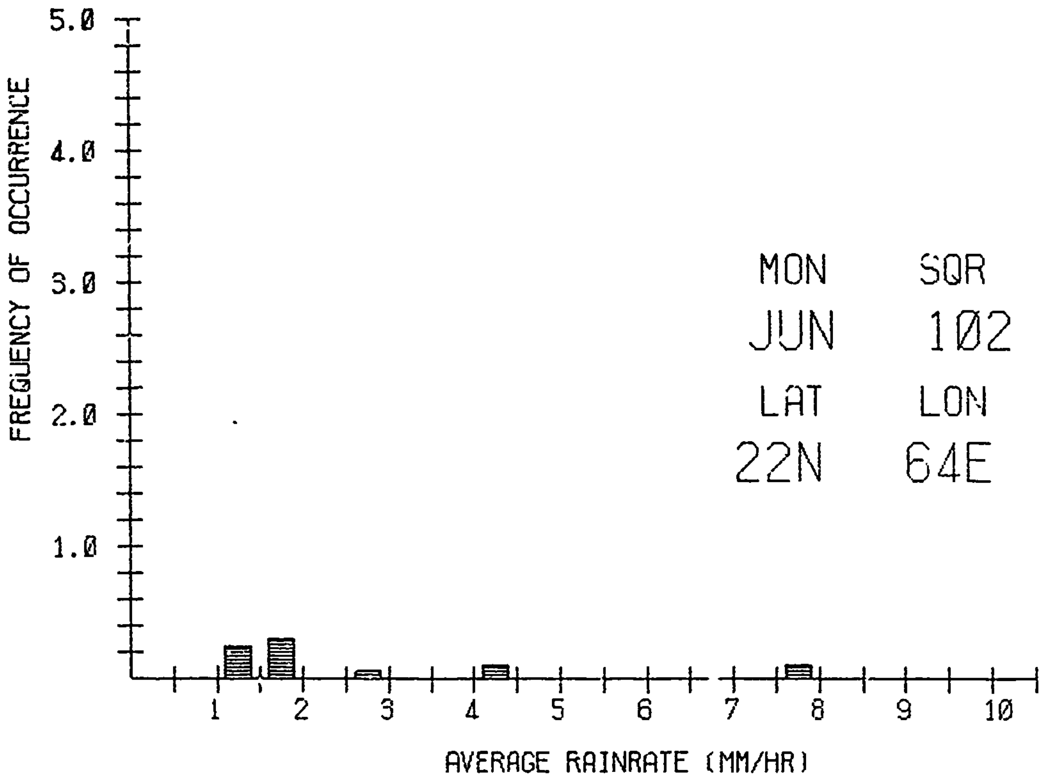
AVERAGE RAINRATE (MM/HR)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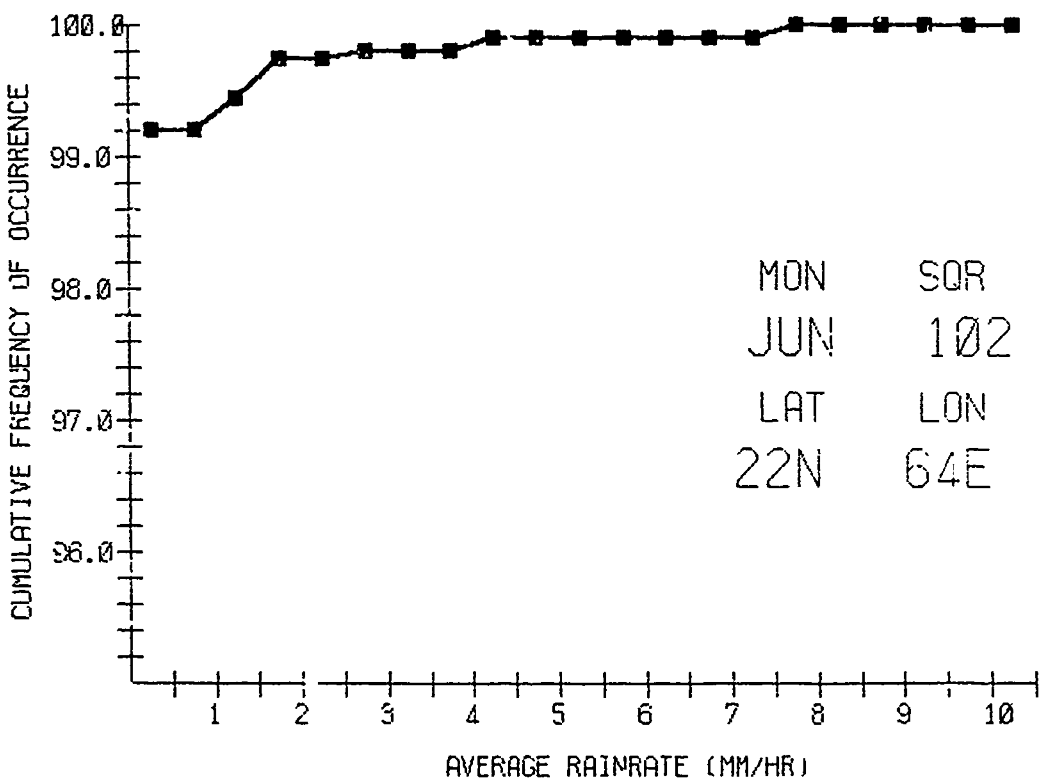
AVERAGE RAINRATE (MM/HR)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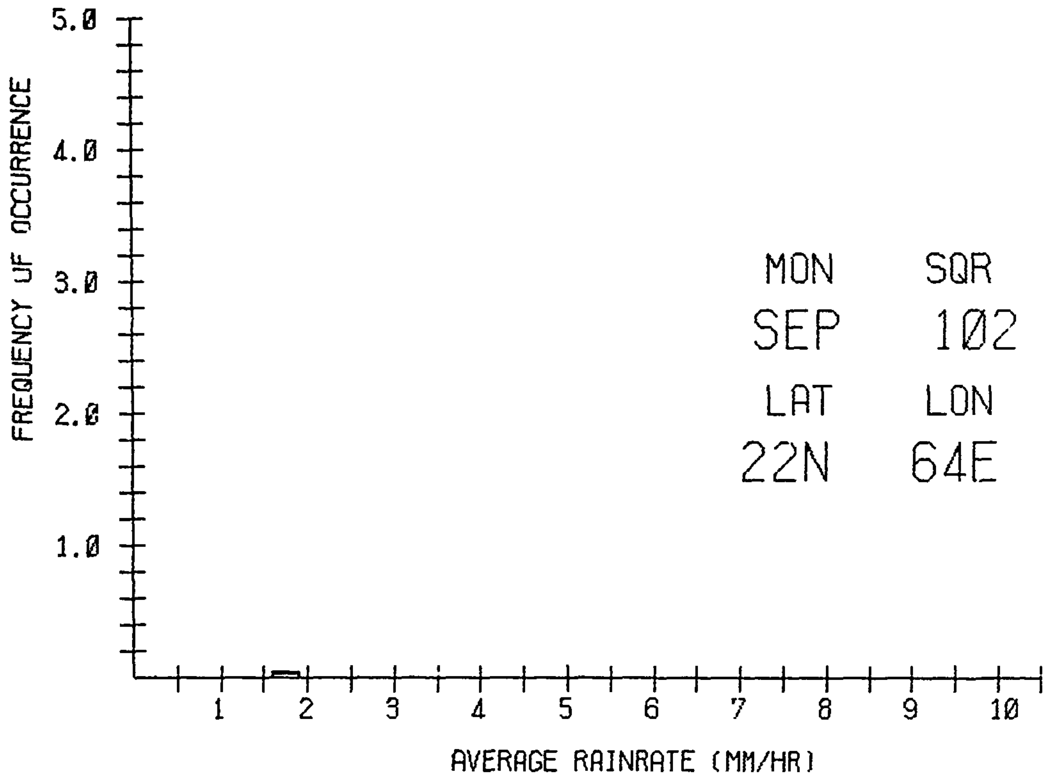

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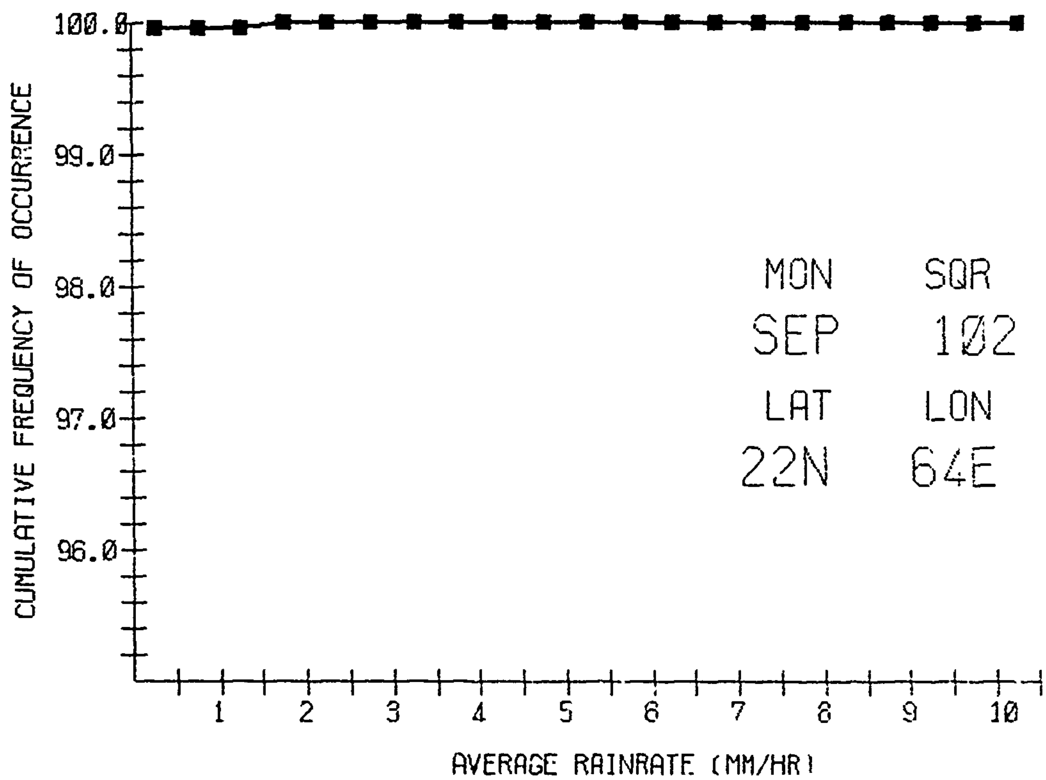
AVERAGE RAINRATE (MM/HR)
MON SQR
SEP 102
LAT LON
22N 64E



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AVERAGE RAINRATE (MM/HR)
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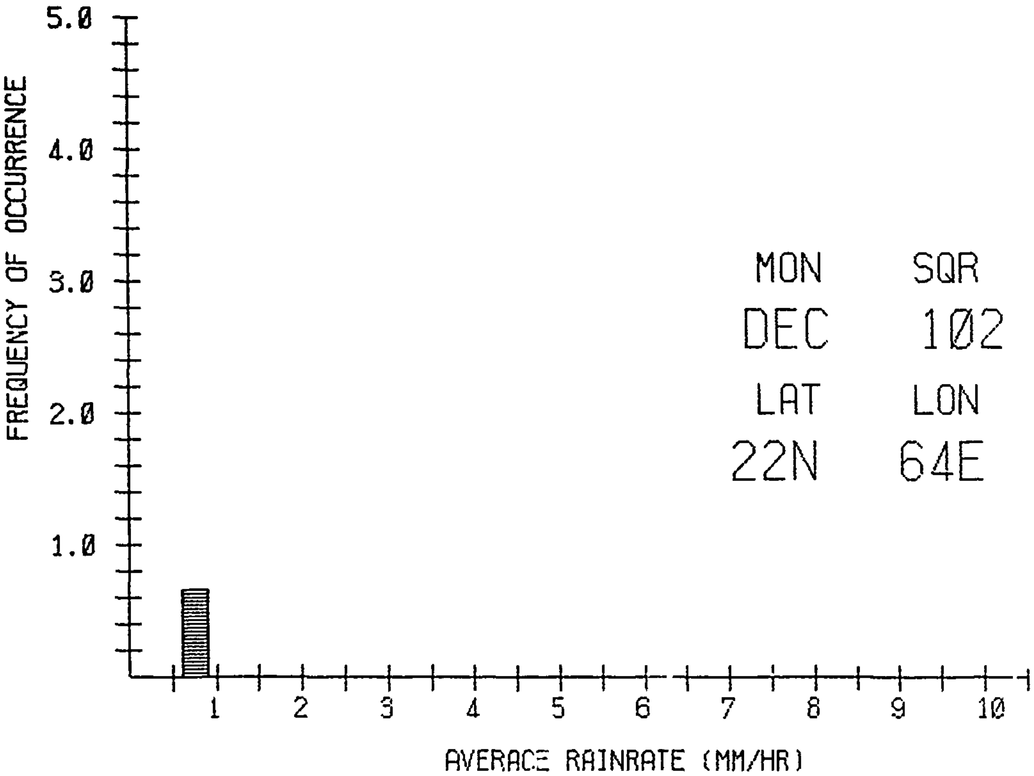
SEP 102
LAT LON
22N 64E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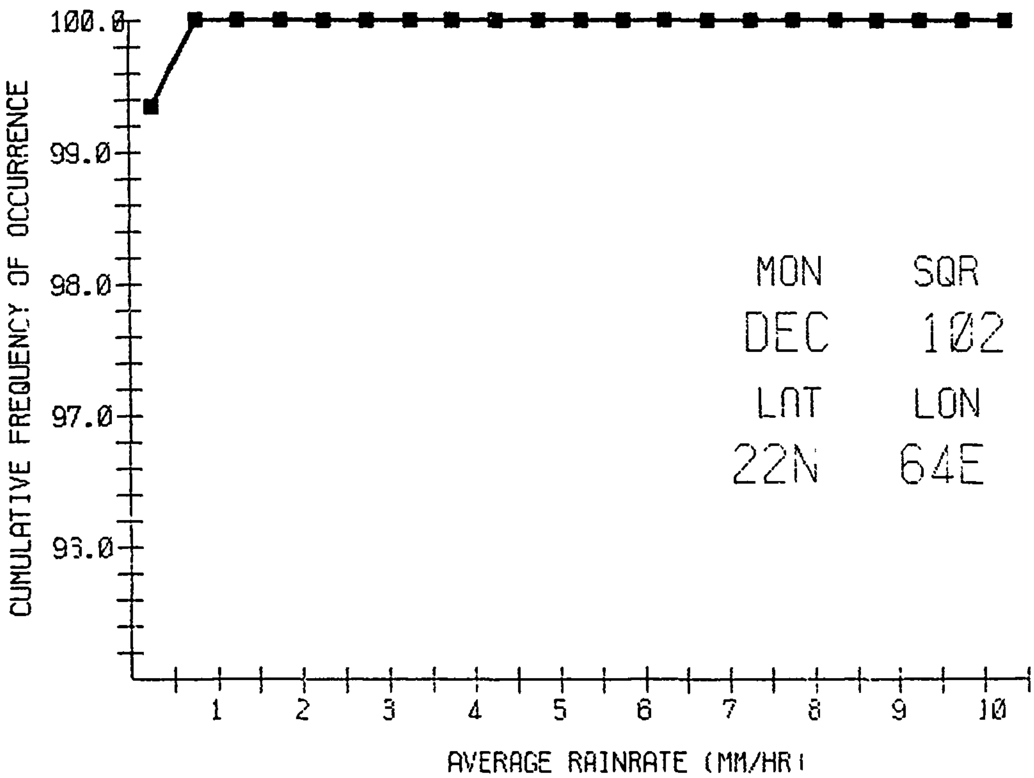
AVERAGE RAINRATE (MM/HR)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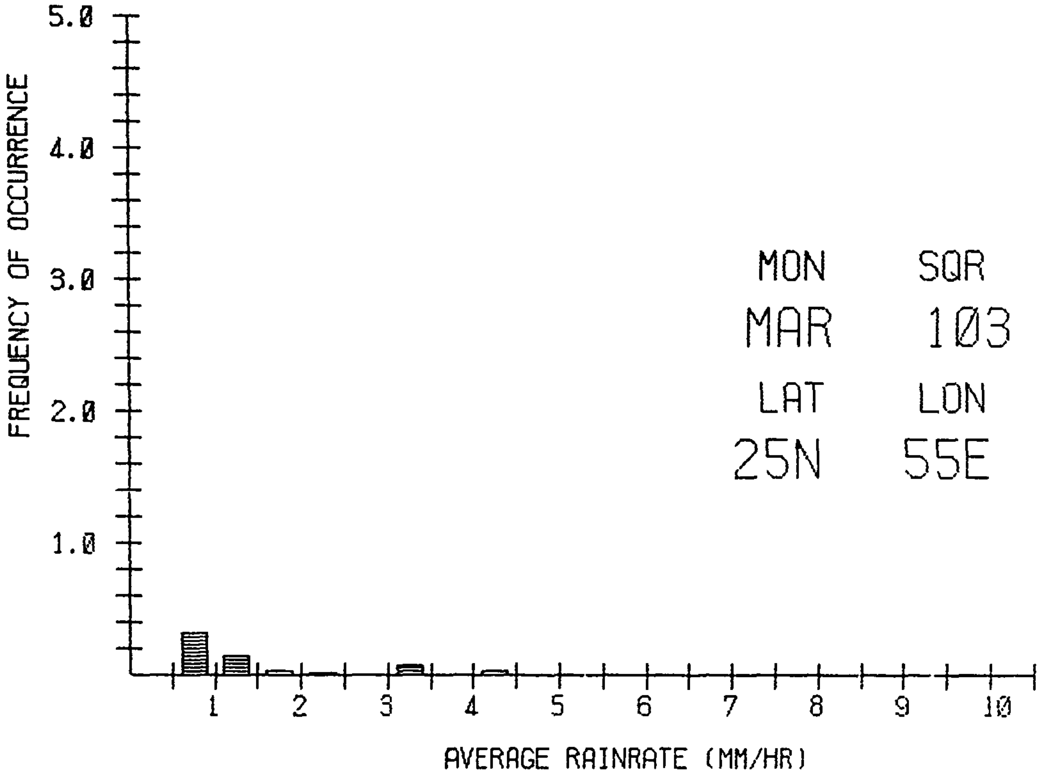
AVERAGE RAINRATE (MM/HR)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MON SQR
MAR 103
LAT LON
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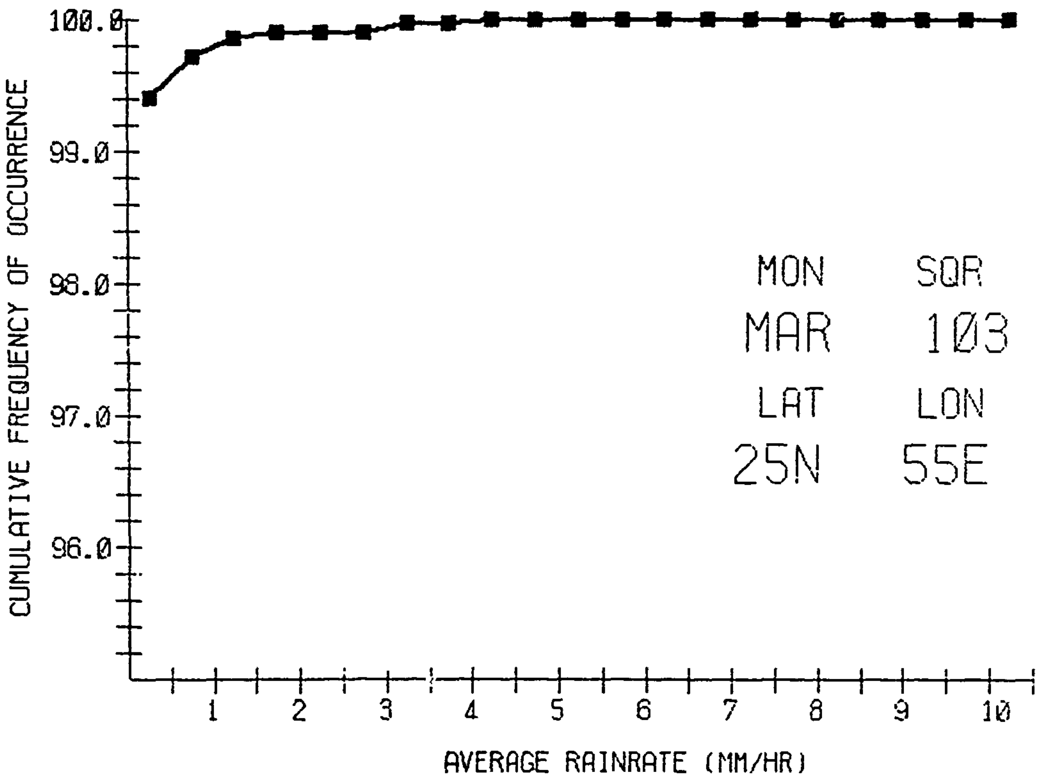
AVERAGE RAINRATE (MM/HR)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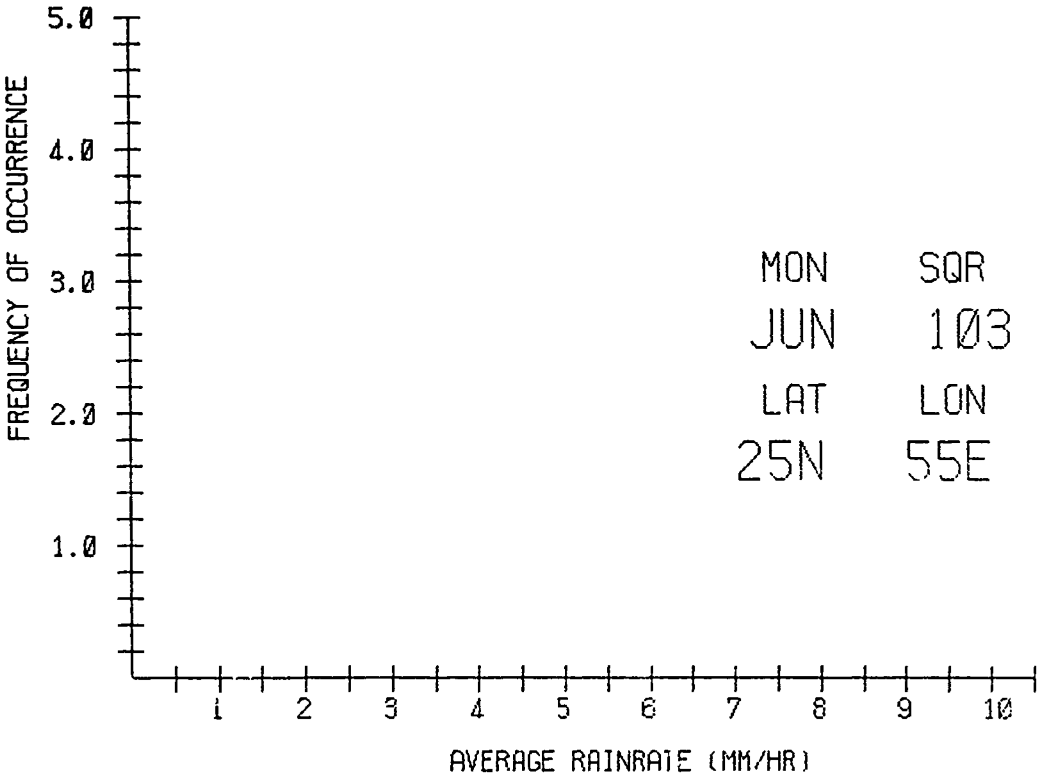
MON SQR
MAR 103
LAT LON
25N 55E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)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FREQUENCY OF OCCURRENCE
1
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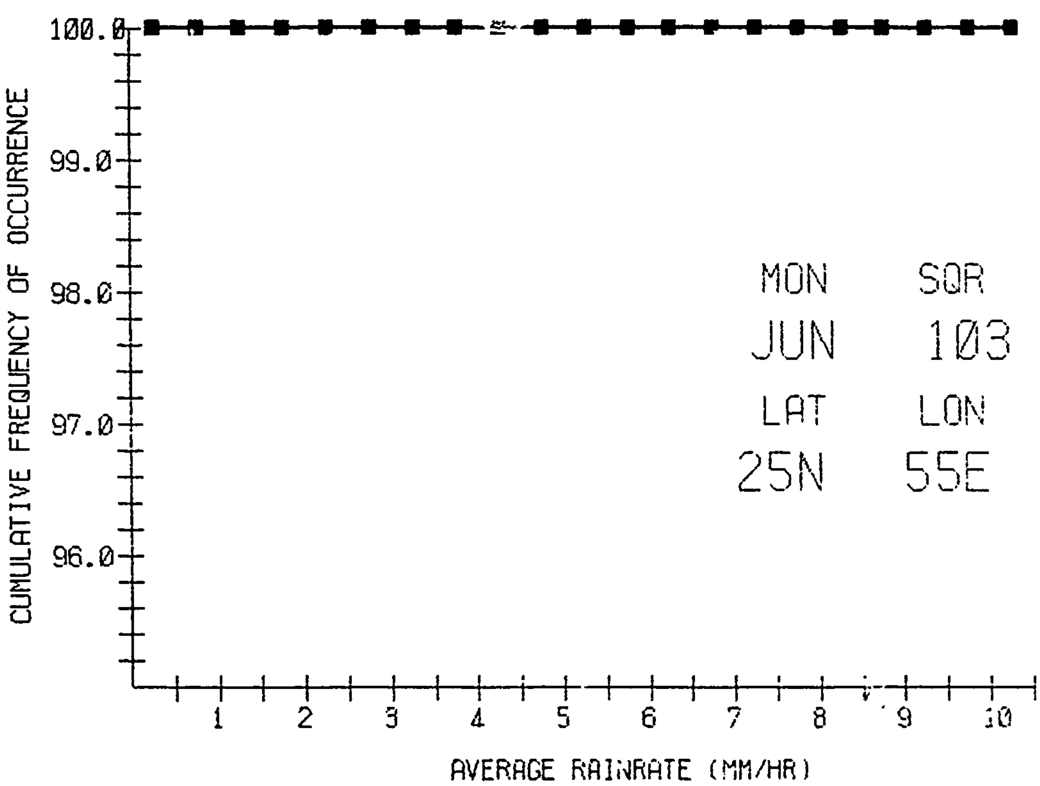
9
10
AVERAGE RAINRATE (MM/HR)
MON
SQR
JUN
103
LAT
LON
25N
55E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CUMULATIVE FREQUENCY OF OCCURRENCE
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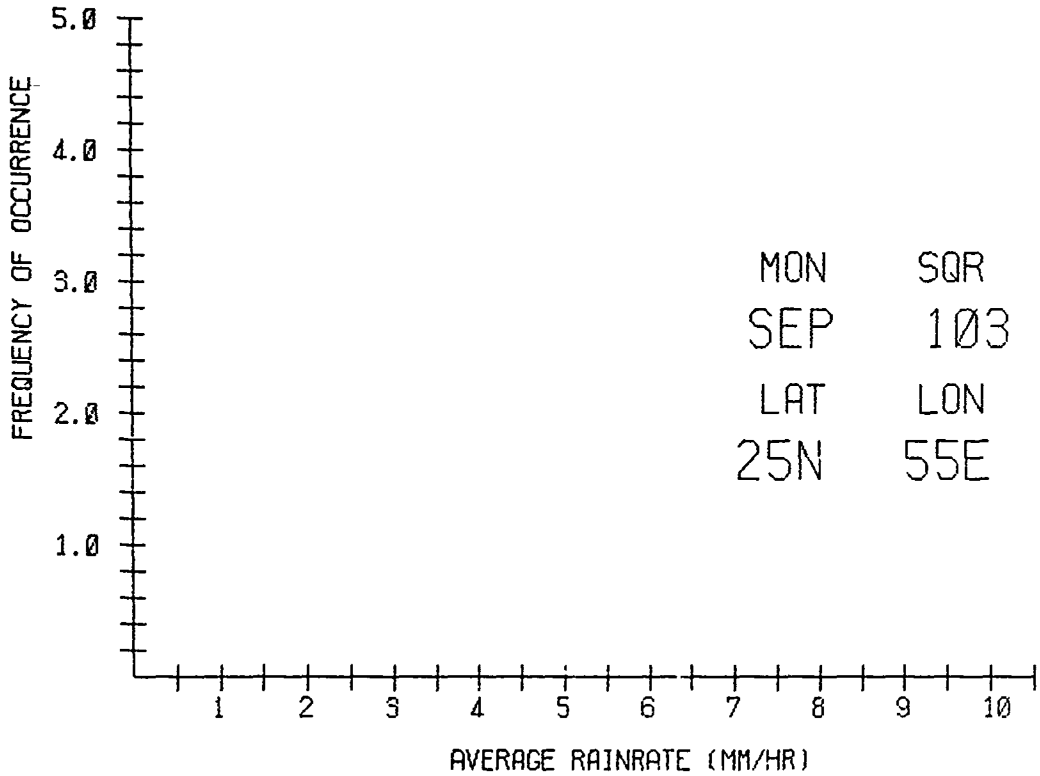
AVERAGE RAINRATE (MM/HR)
MON
SQR
JUN
103
LAT
LON
25N
55E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1.0
FREQUENCY OF OCCURRENCE
MON SQR
SEP 103
LAT LON
25N 55E
1
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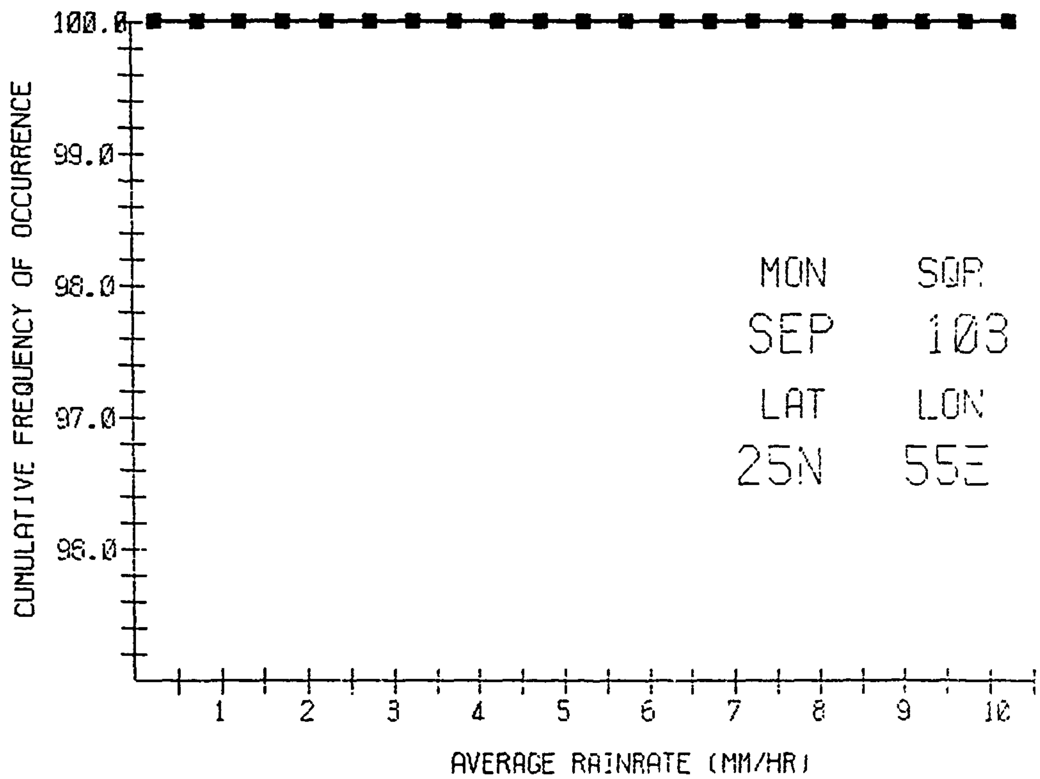
10
AVERAGE RAINRATE (MM/HR)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CUMULATIVE FREQUENCY OF OCCURRENCE
MON SQR
SEP 103
LAT LON
25N 55E
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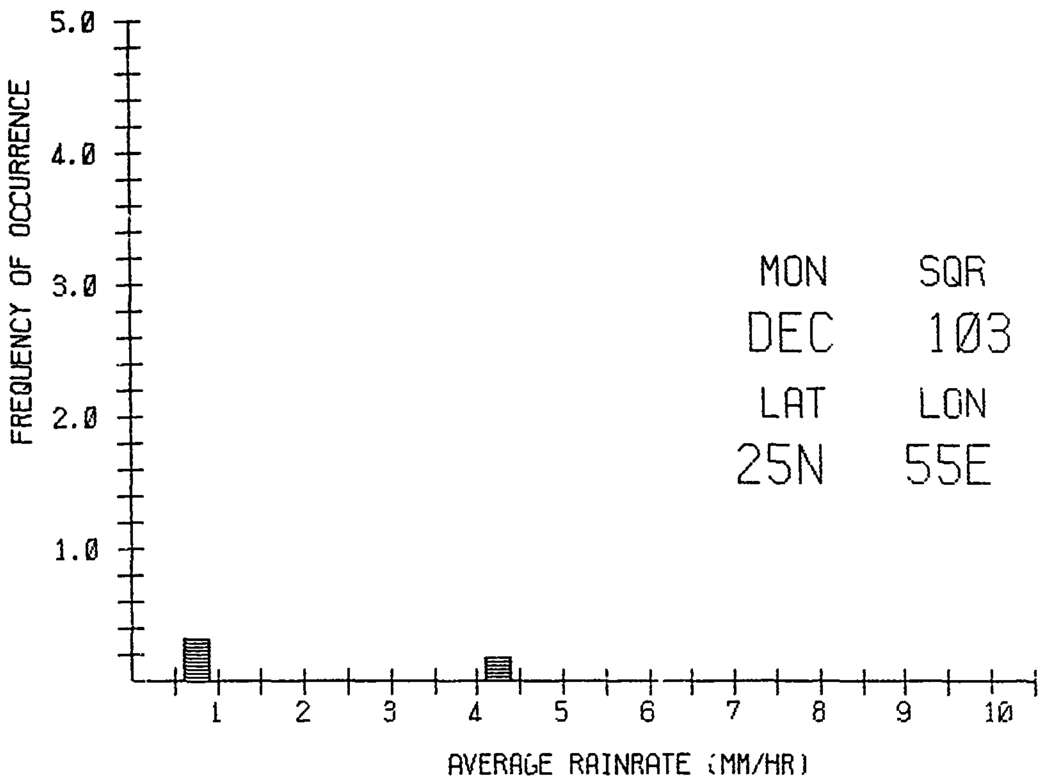
AVERAGE RAINRATE (MM/HR)



FREQUENCY OF OCCURRENCE
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DEC 103
LAT LON
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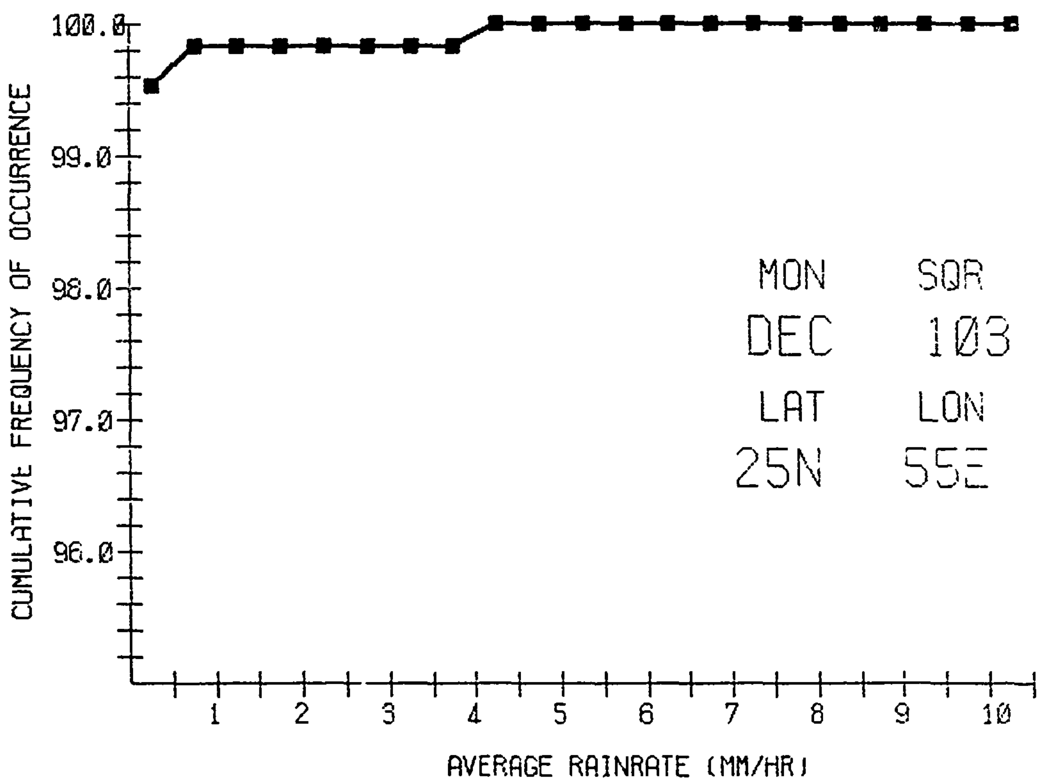
AVERAGE RAINRATE (MM/HR)



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LAT LON
25N 55E
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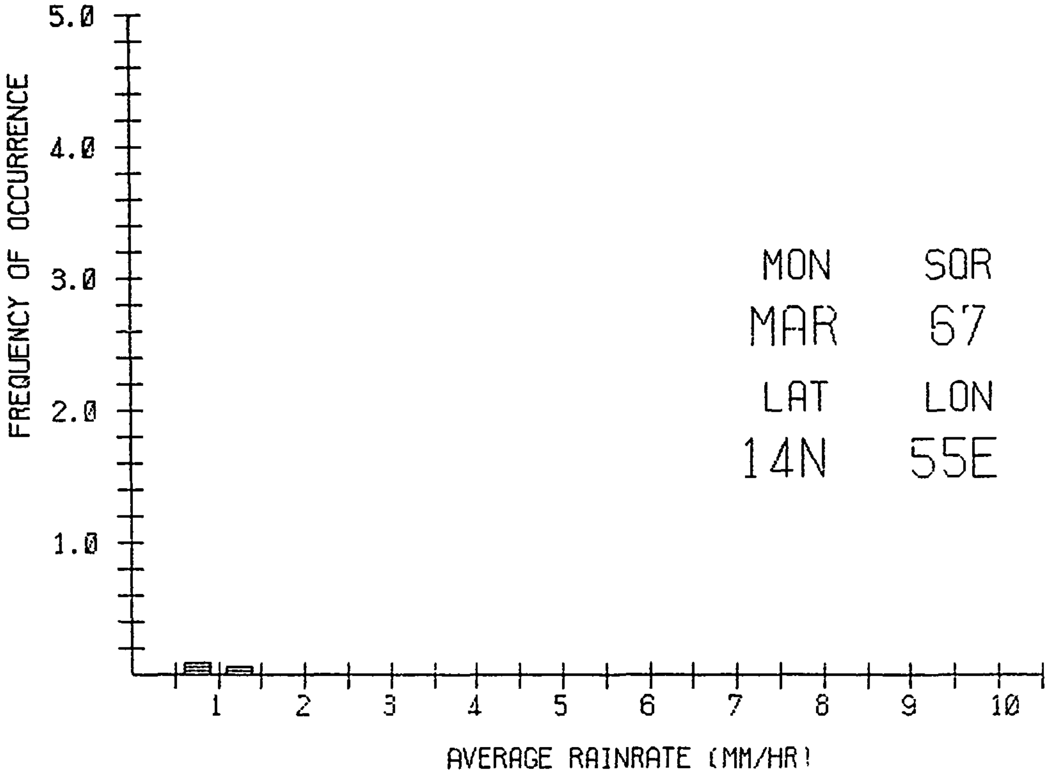
AVERAGE RAINRATE (MM/HR)



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14N 55E
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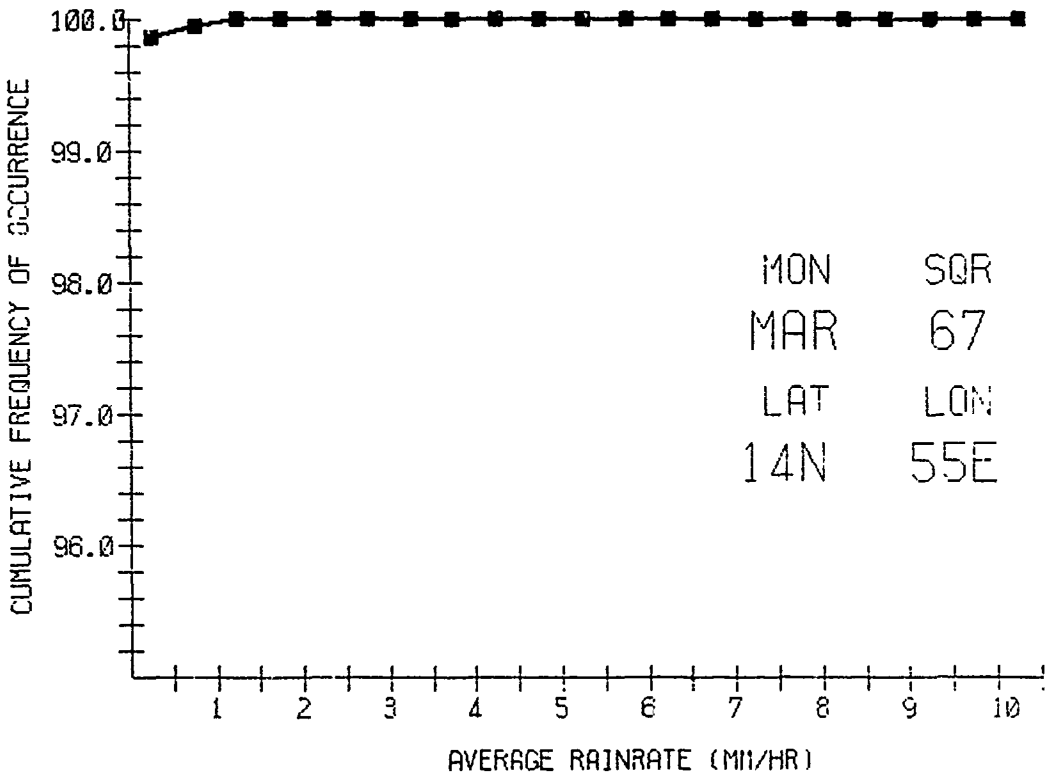
AVERAGE RAINRATE (MM/HR)



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CUMULATIVE FREQUENCY OF OCCURRENCE
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MAR 67
LAT LON
14N 55E
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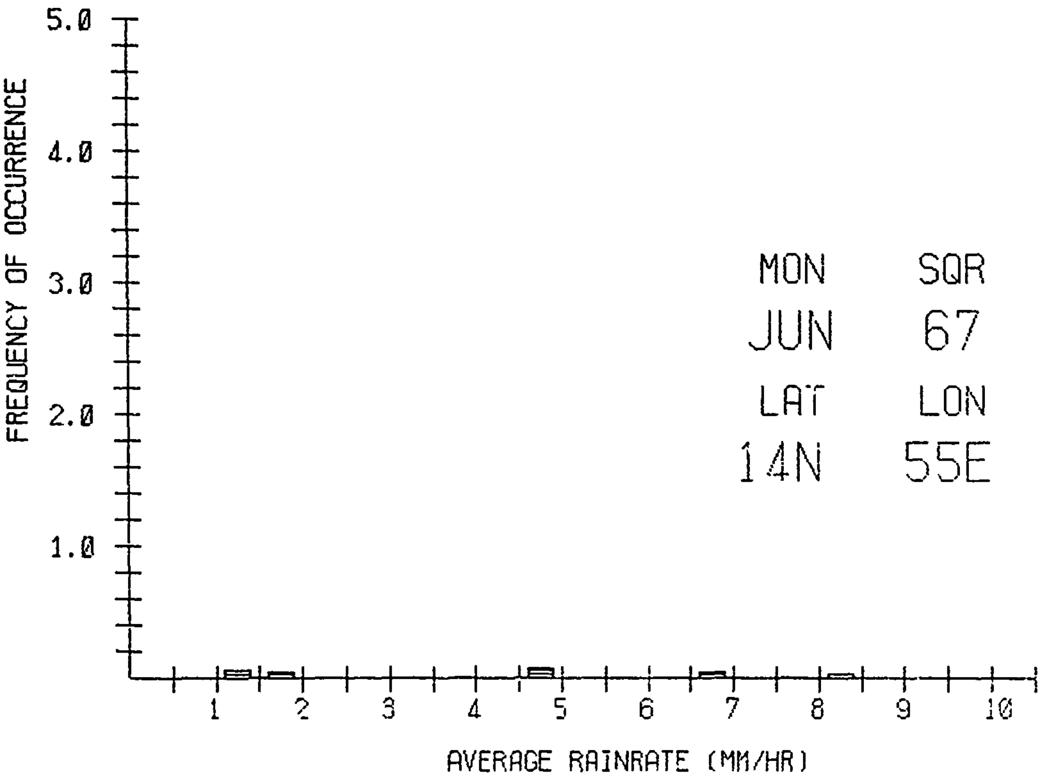
AVERAGE RAINRATE (MM/HR)



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FREQUENCY OF OCCURRENCE
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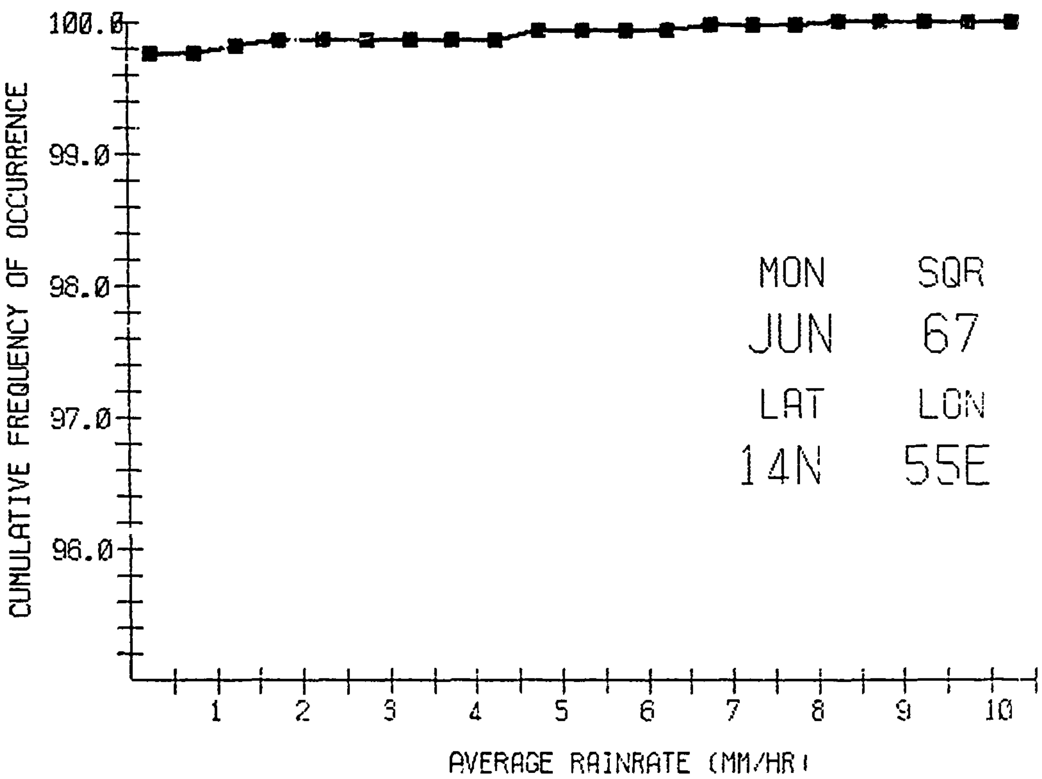
AVERAGE RAINRATE (MM/HR)
MON
SQR
JUN
67
LAT
LON
14N
55E



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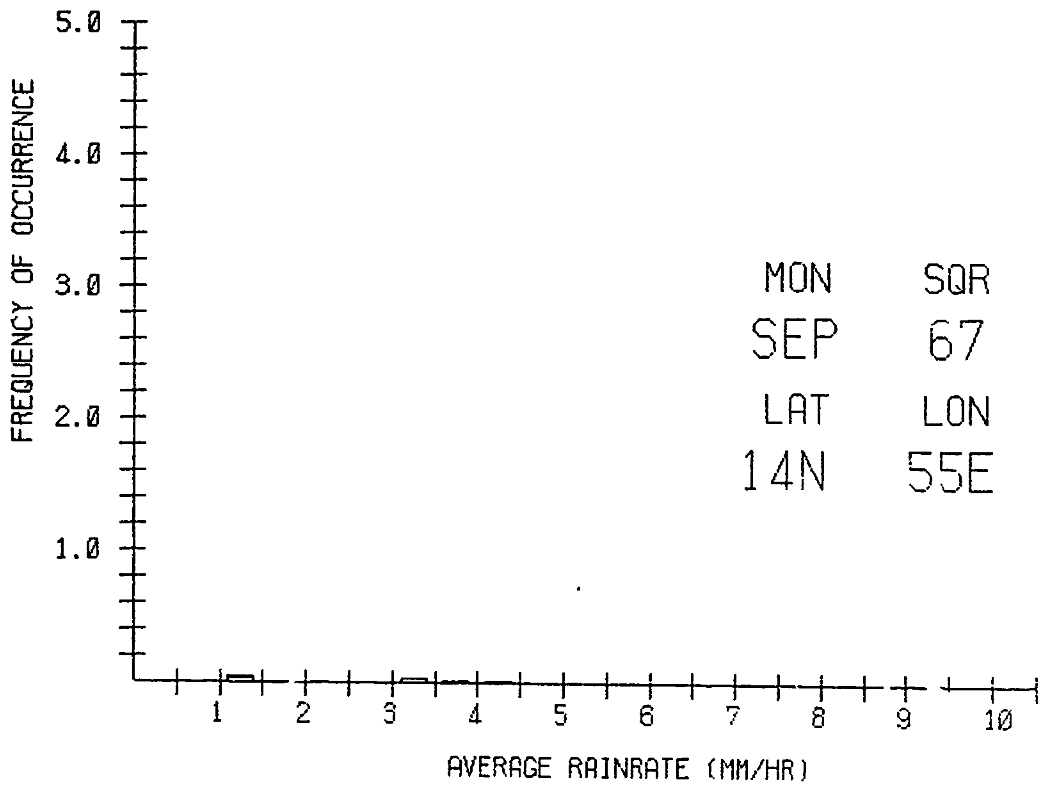
LAT
LON
14N
55E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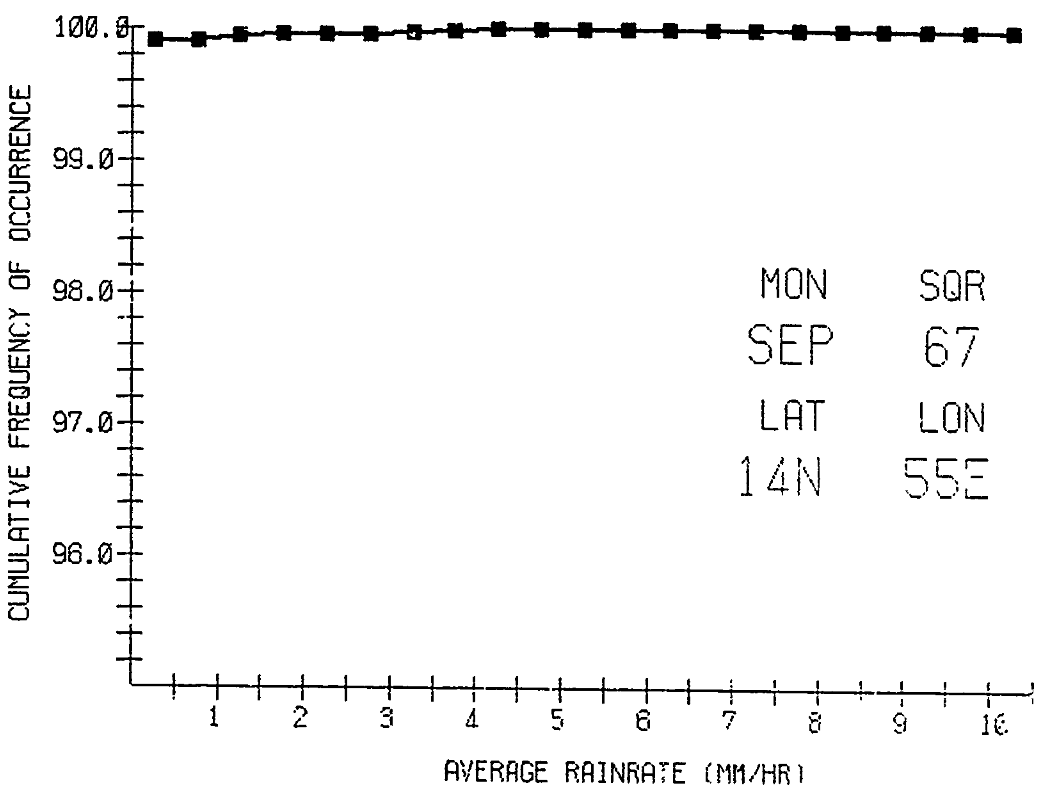
AVERAGE RAINRATE (MM/HR)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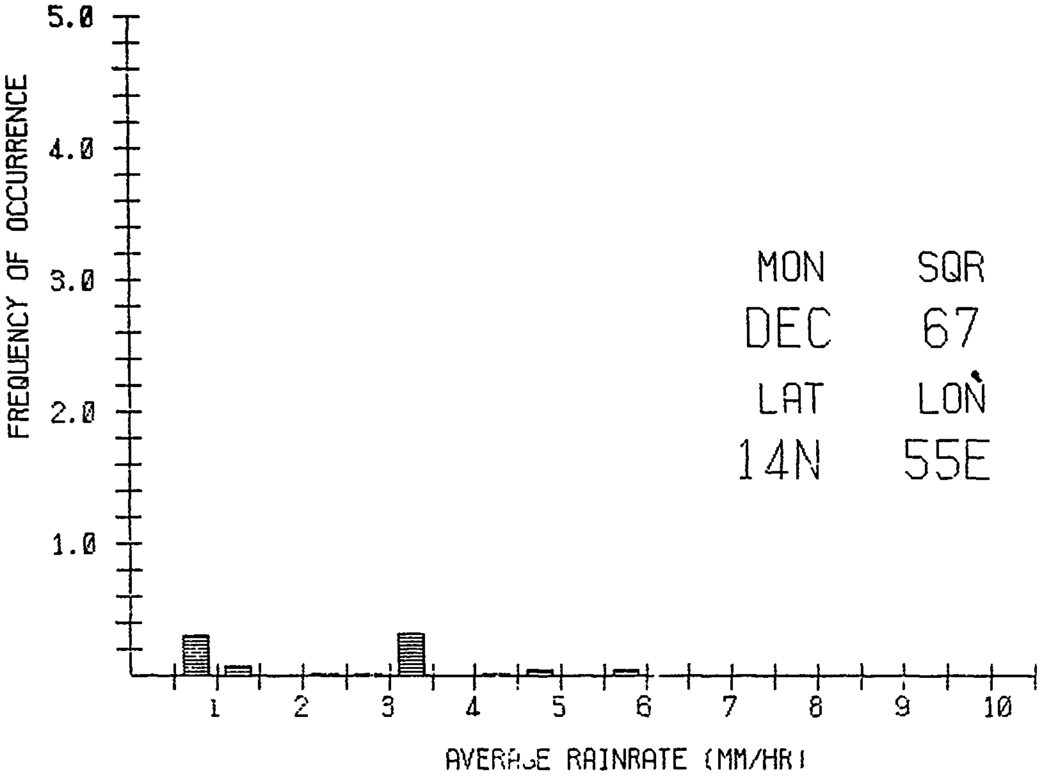
AVERAGE RAINRATE (MM/HR)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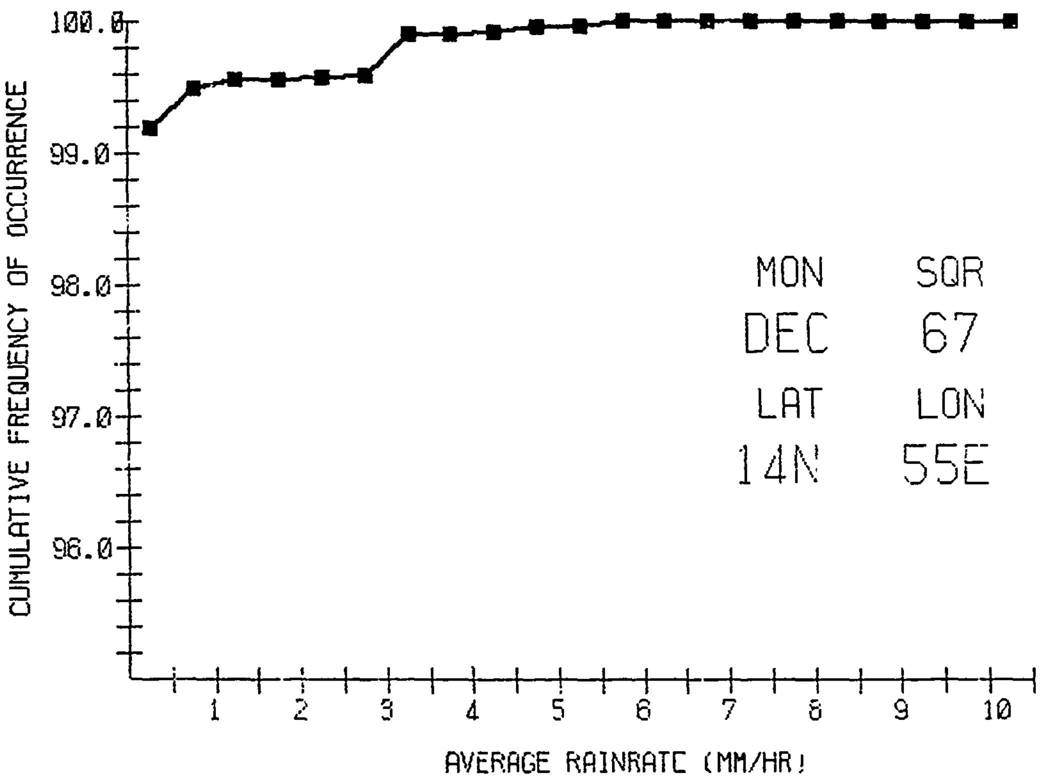
AVERAGE RAINRATE (MM/HR)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CUMULATIVE FREQUENCY OF OCCURRENCE
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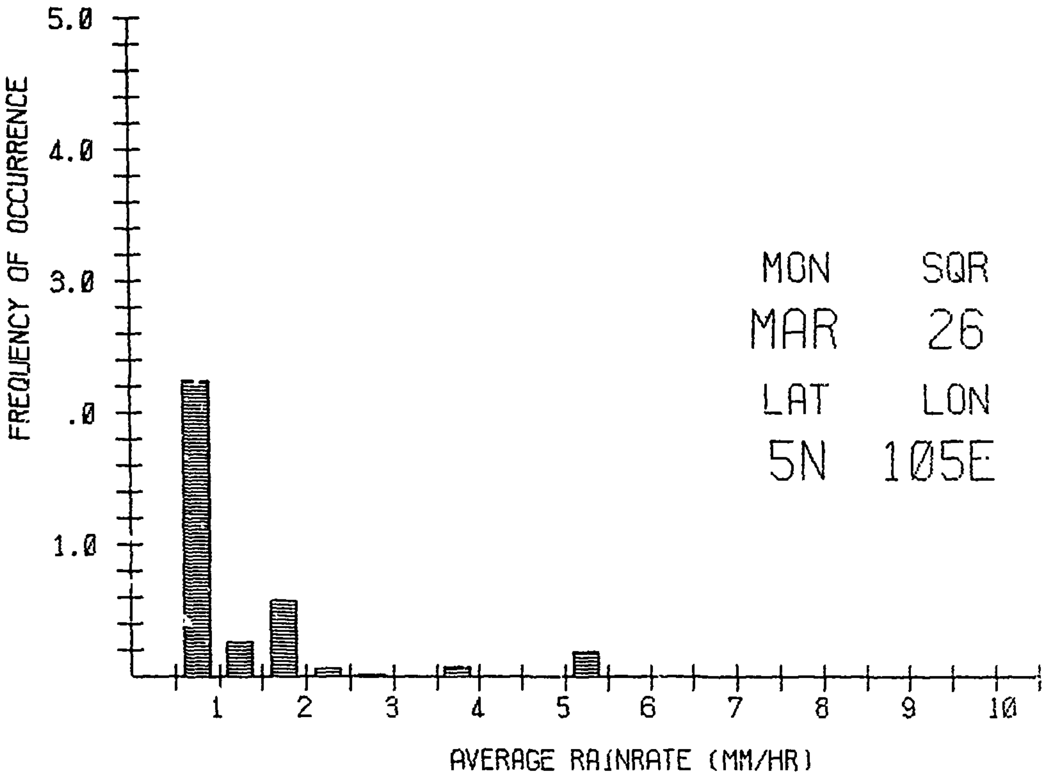
AVERAGE RAINRATE (MM/HR)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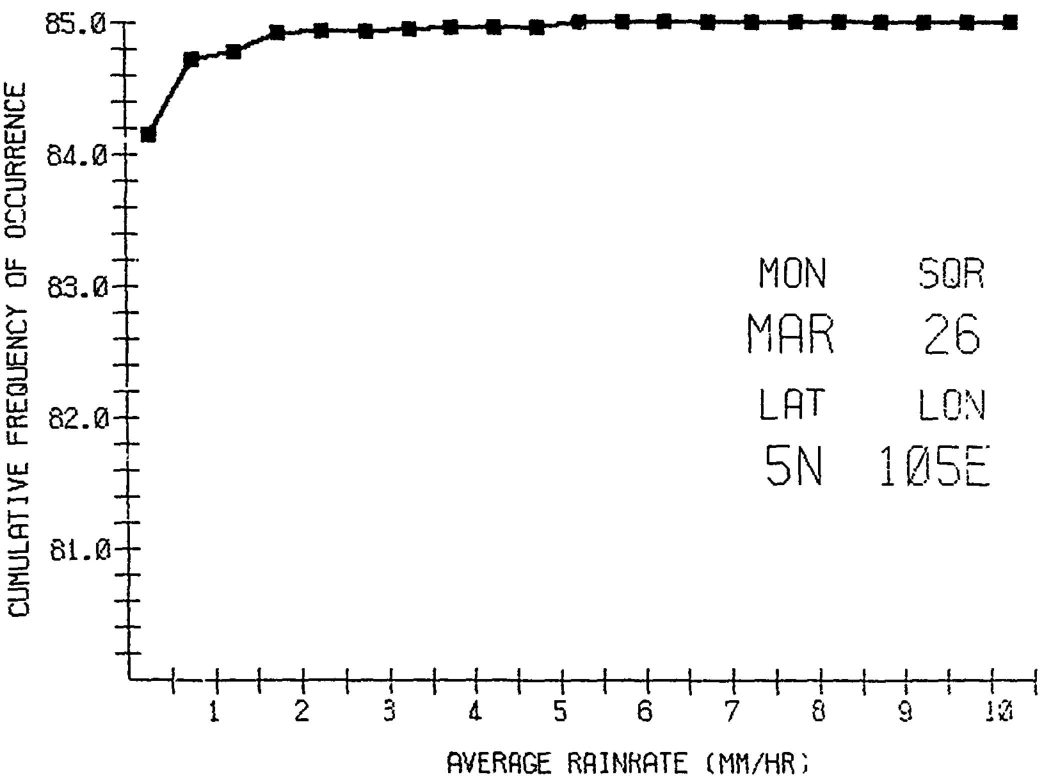
AVERAGE RAINRATE (MM/HR)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CUMULATIVE FREQUENCY OF OCCURRENCE
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MAR 26
LAT LON
5N 105E
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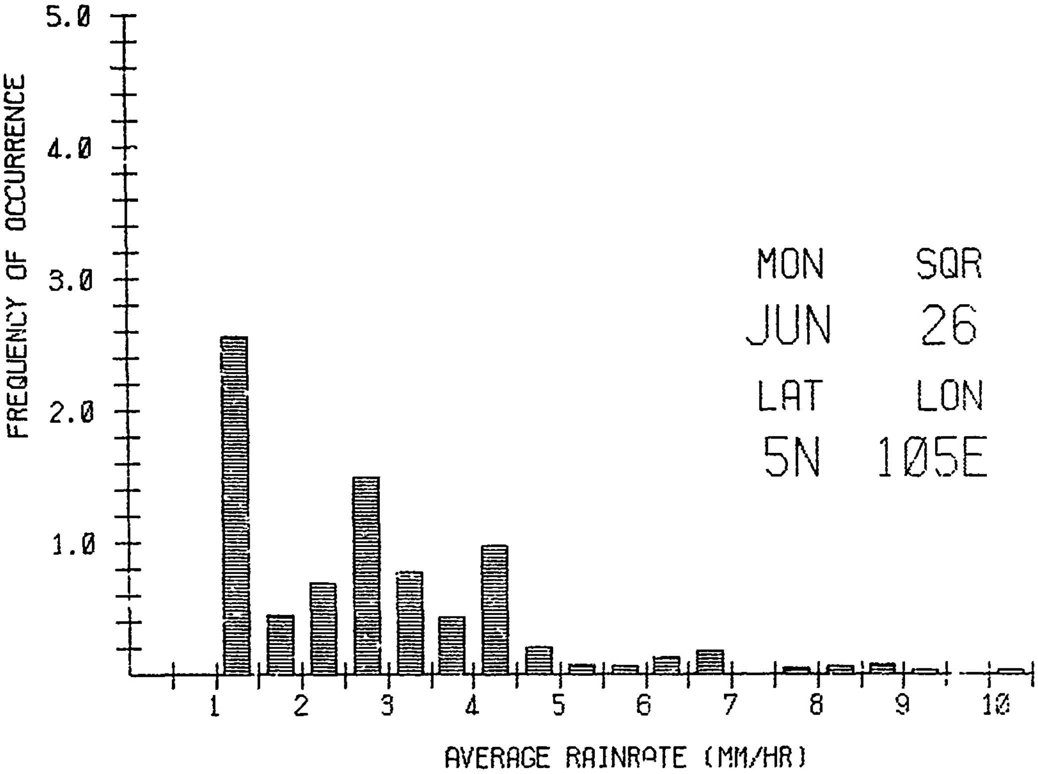
AVERAGE RAINRATE (MM/HR)



FREQUENCY OF OCCURRENCE
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MON SQR
JUN 26
LAT LON
5N 105E
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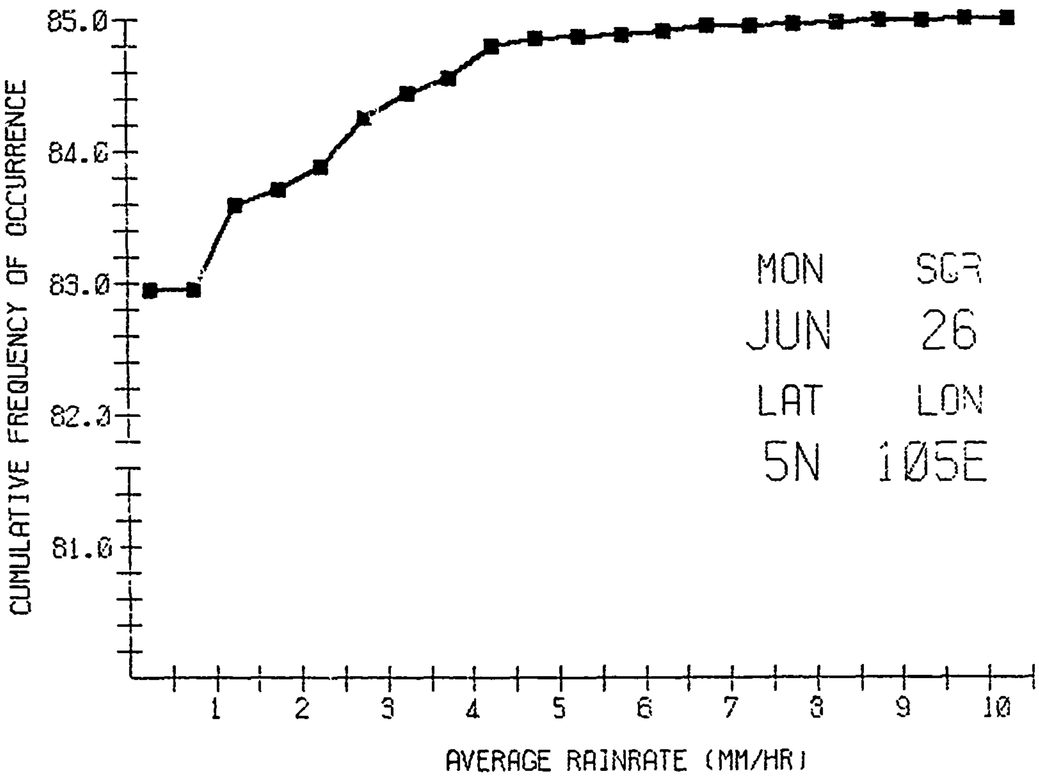
AVERAGE RAINRATE (MM/HR)



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JUN 26
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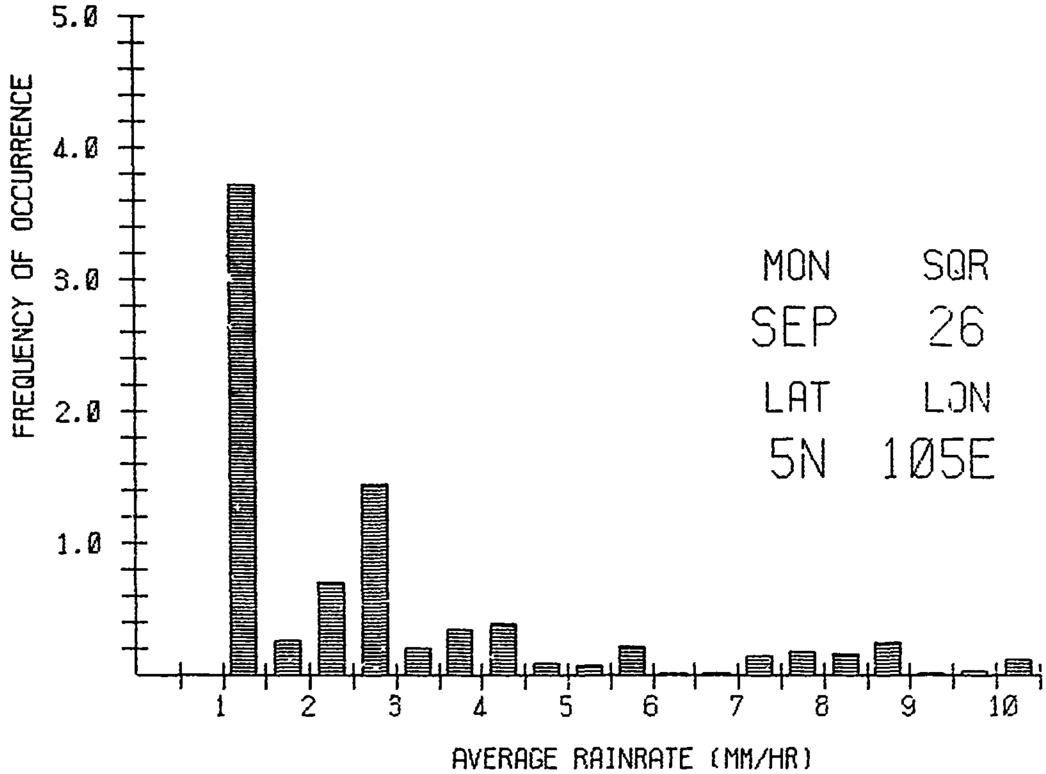
AVERAGE RAINRATE (MM/HR)



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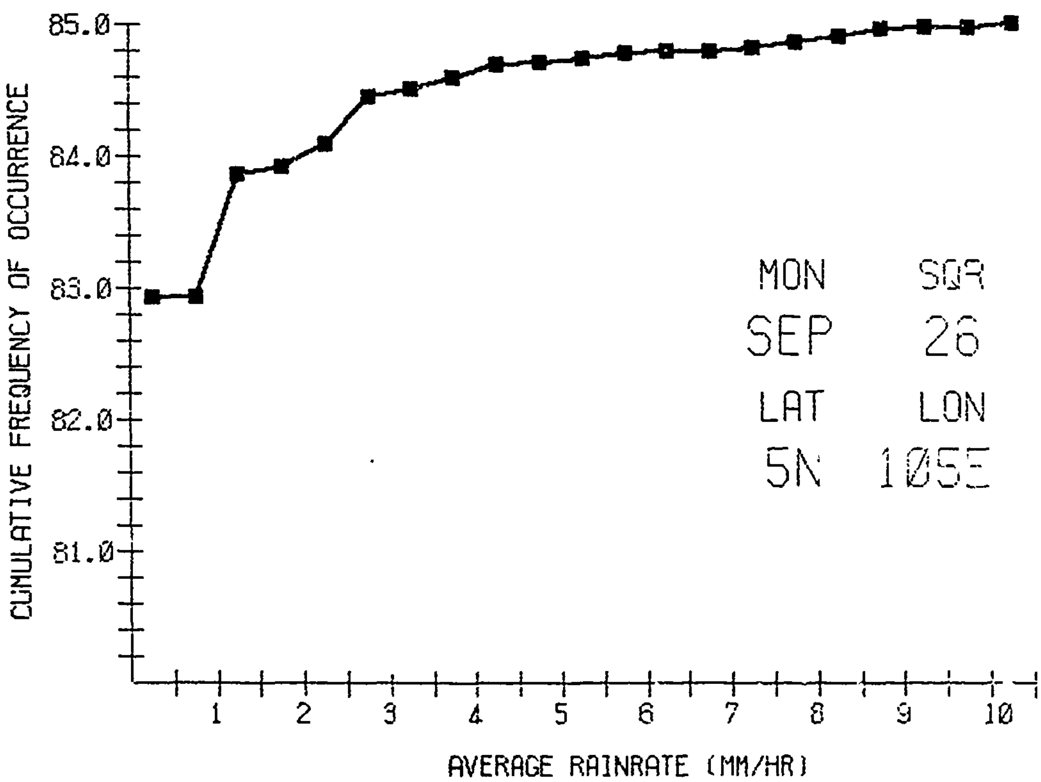
AVERAGE RAINRATE (MM/HR)



CUMULATIVE FREQUENCY OF OCCURRENCE
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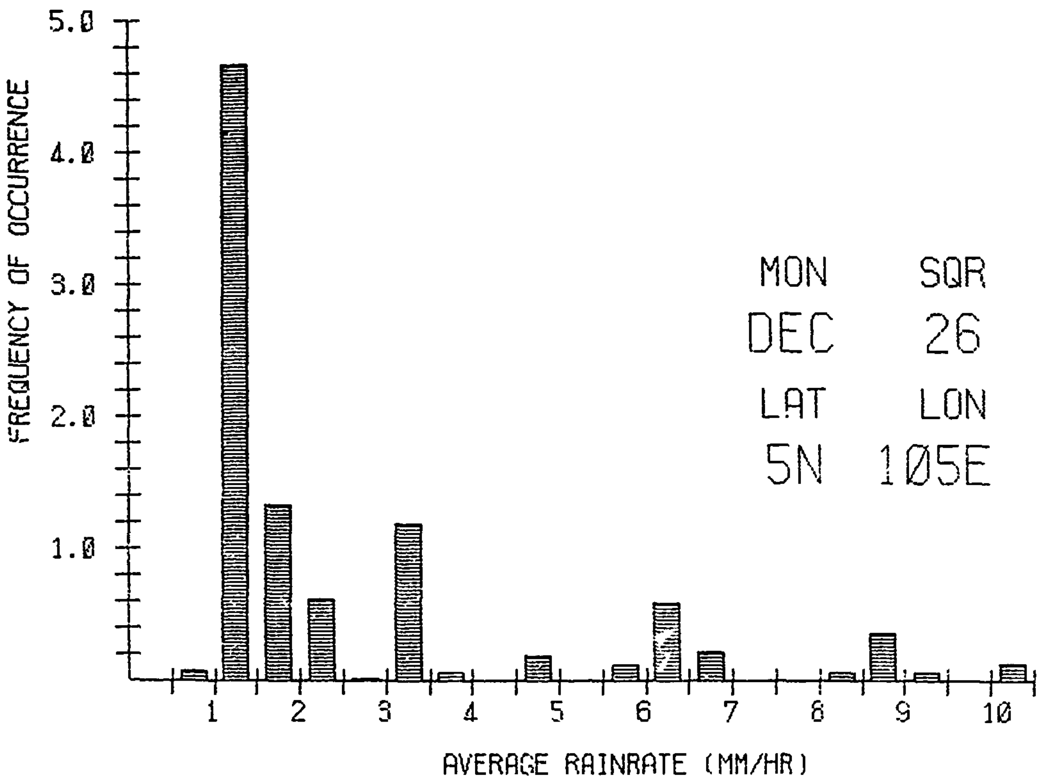
AVERAGE RAINRATE (MM/HR)



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FREQUENCY OF OCCURRENCE
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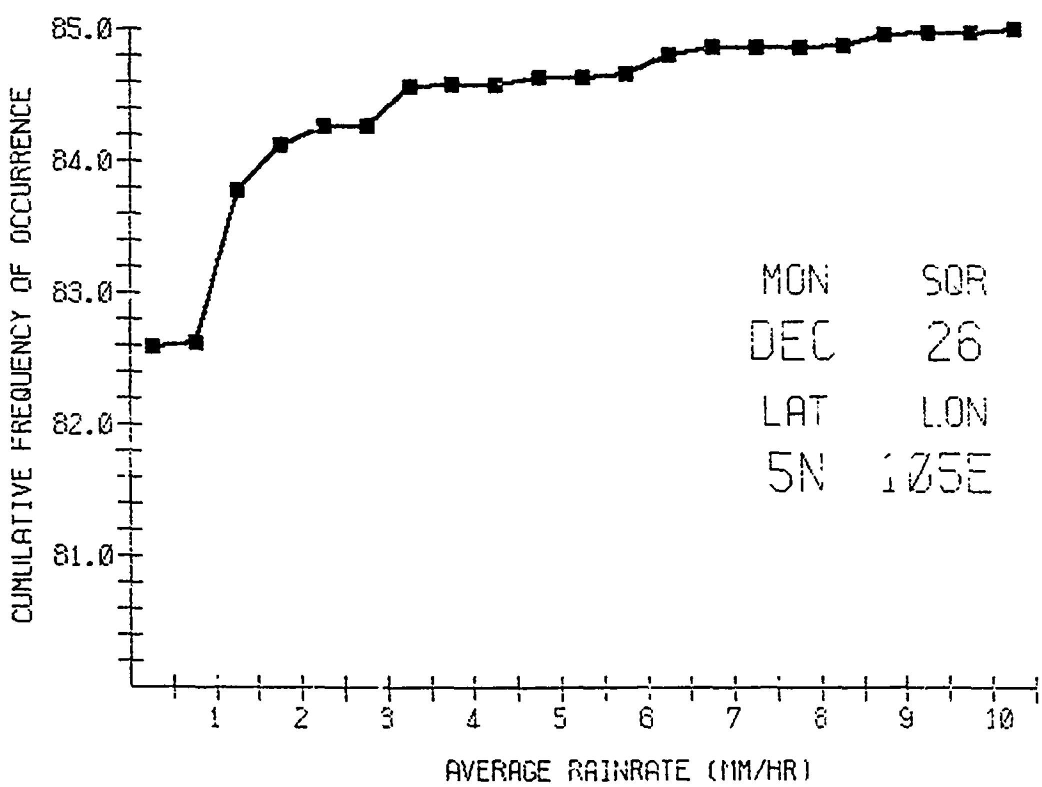
AVERAGE RAINRATE (MM/HR)
MON SQR
DEC 26
LAT LON
5N 105E



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CUMULATIVE FREQUENCY OF OCCURRENCE
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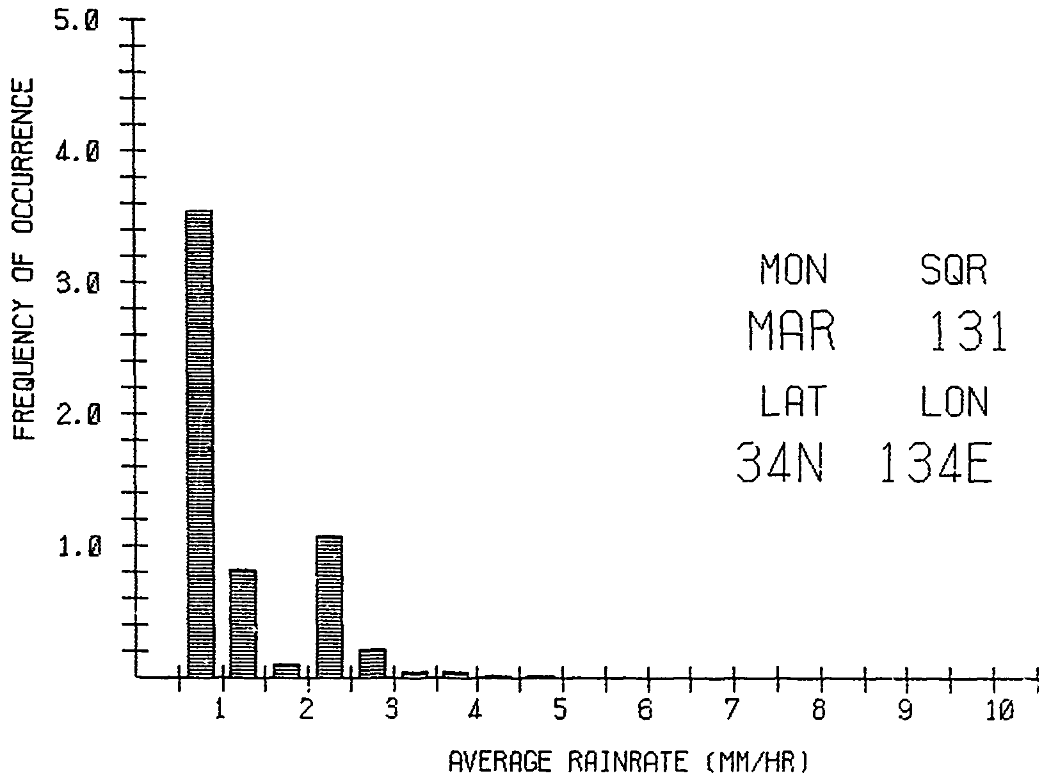
AVERAGE RAINRATE (MM/HR)
MON SQR
DEC 26
LAT LON
5N 105E



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MAR 131
LAT LON
34N 134E
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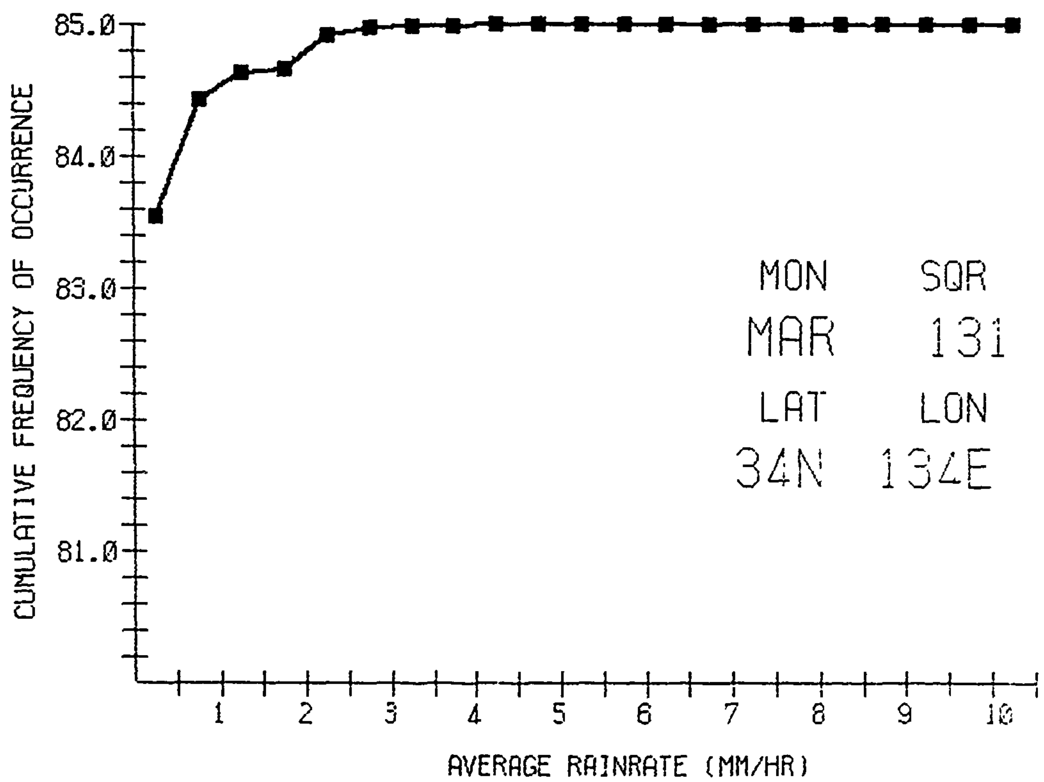
AVERAGE RAINRATE (MM/HR)



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CUMULATIVE FREQUENCY OF OCCURRENCE
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MAR 131
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34N 134E
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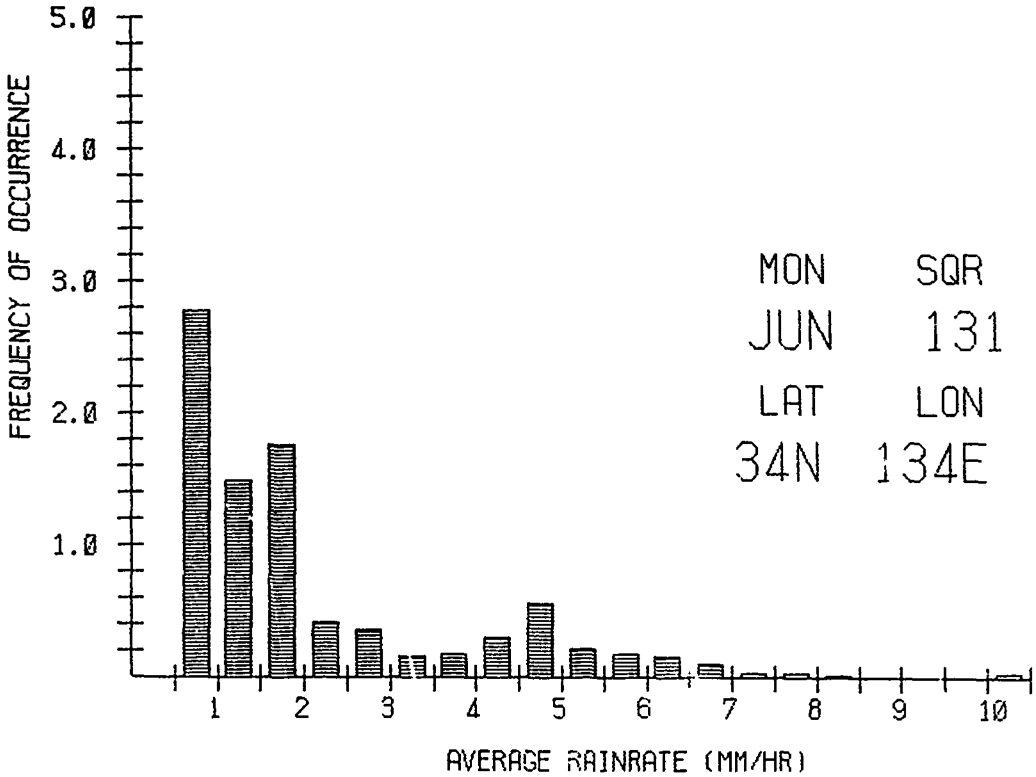
AVERAGE RAINRATE (MM/HR)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34N 134E
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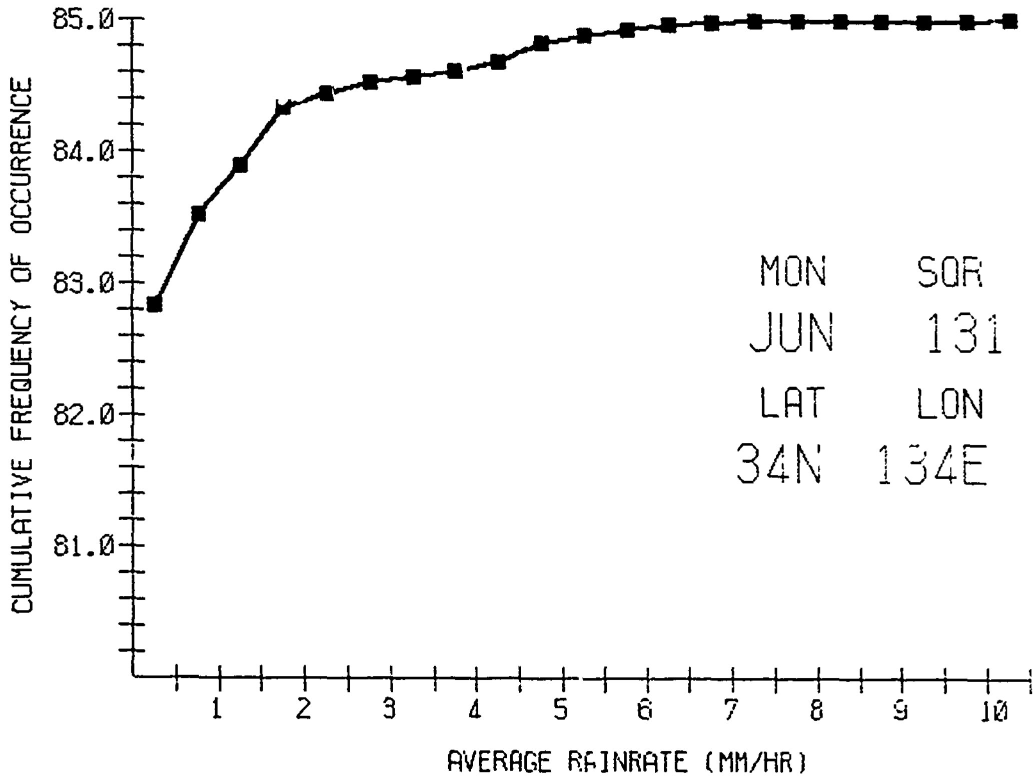
AVERAGE RAINRATE (MM/HR)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CUMULATIVE FREQUENCY OF OCCURRENCE
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JUN 131
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34N 134E
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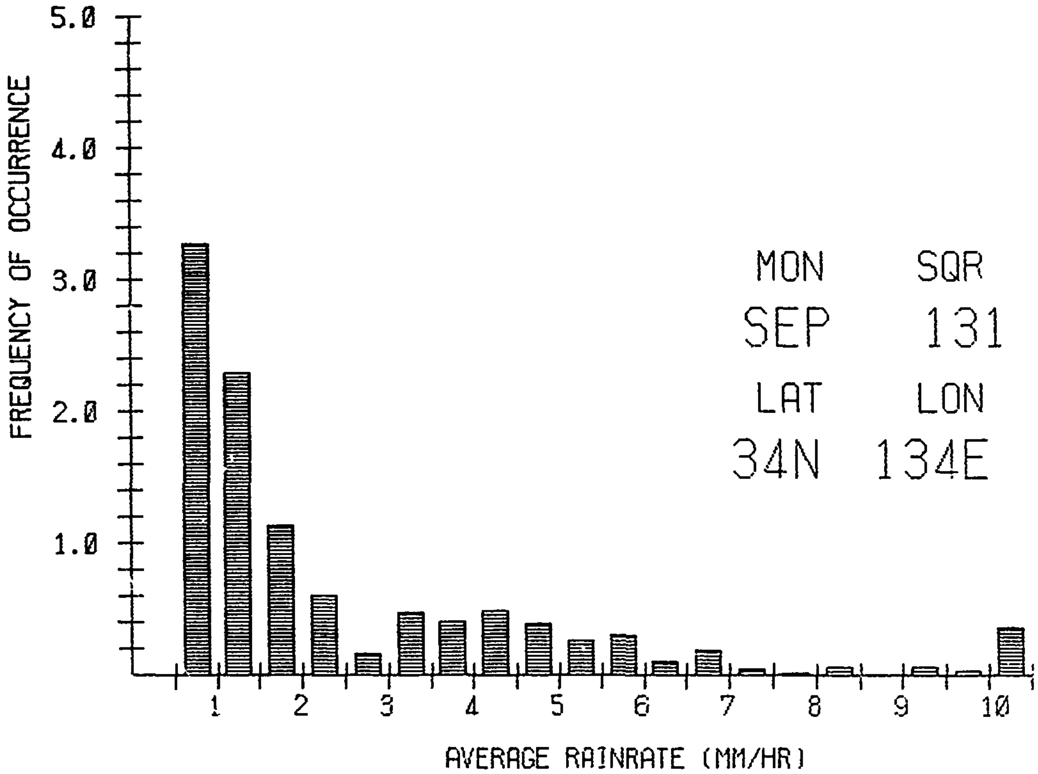
AVERAGE RAINRATE (MM/HR)



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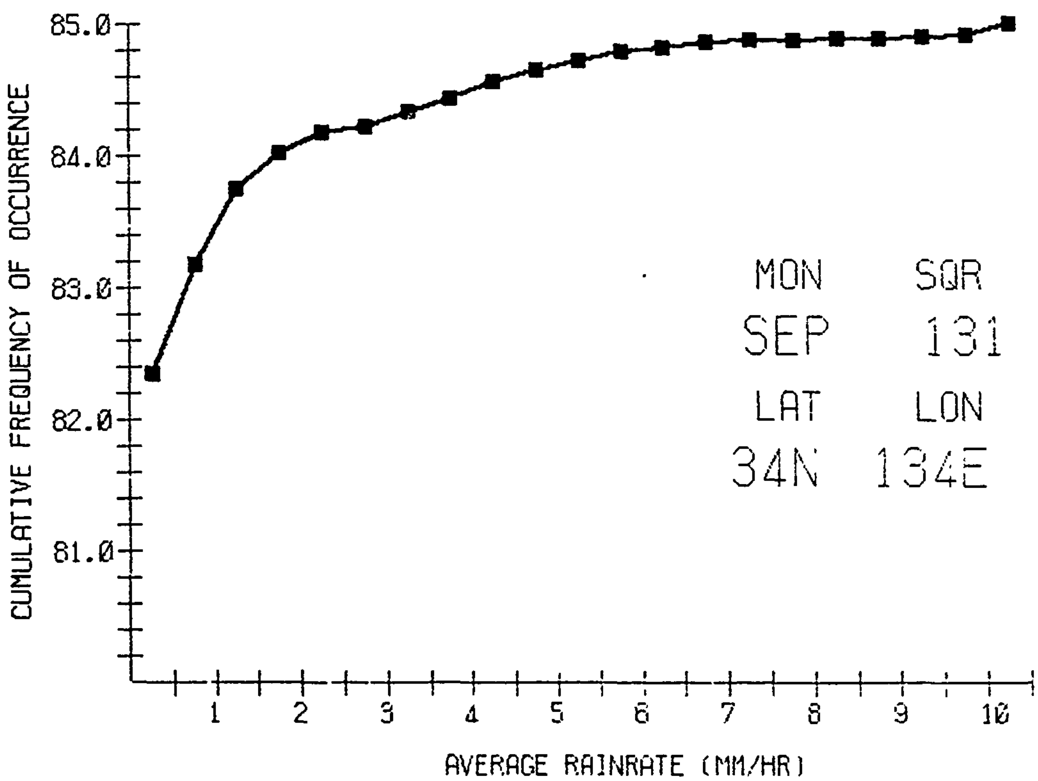
AVERAGE RAINRATE (MM/HR)



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CUMULATIVE FREQUENCY OF OCCURRENCE
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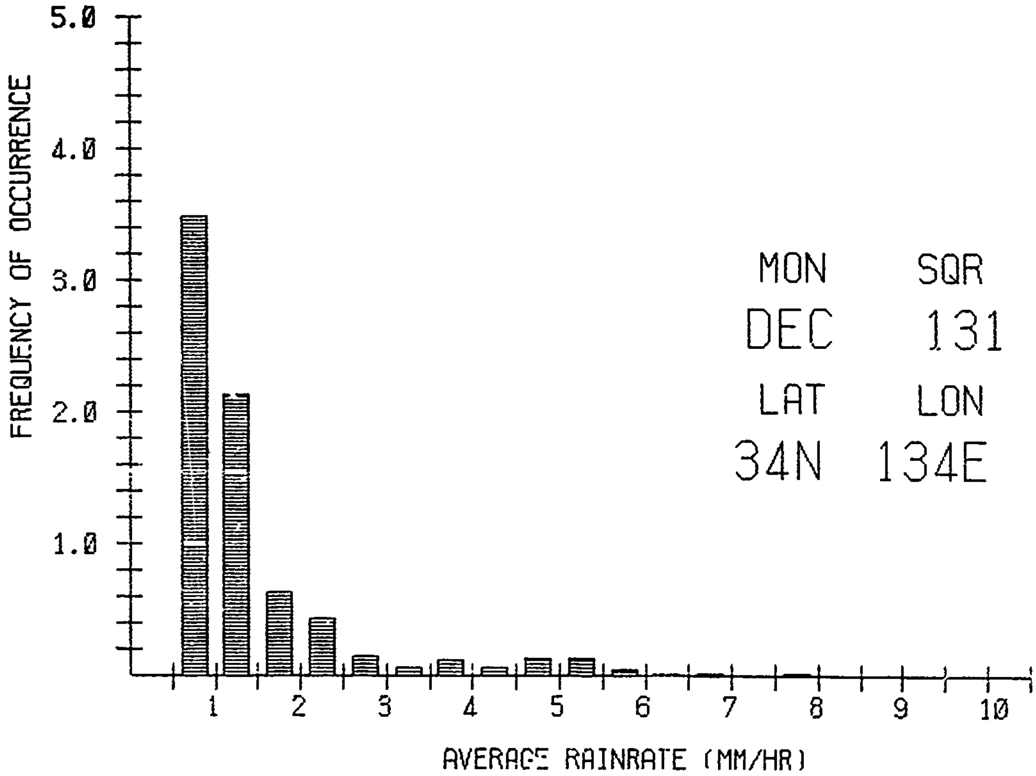
AVERAGE RAINRATE (MM/HR)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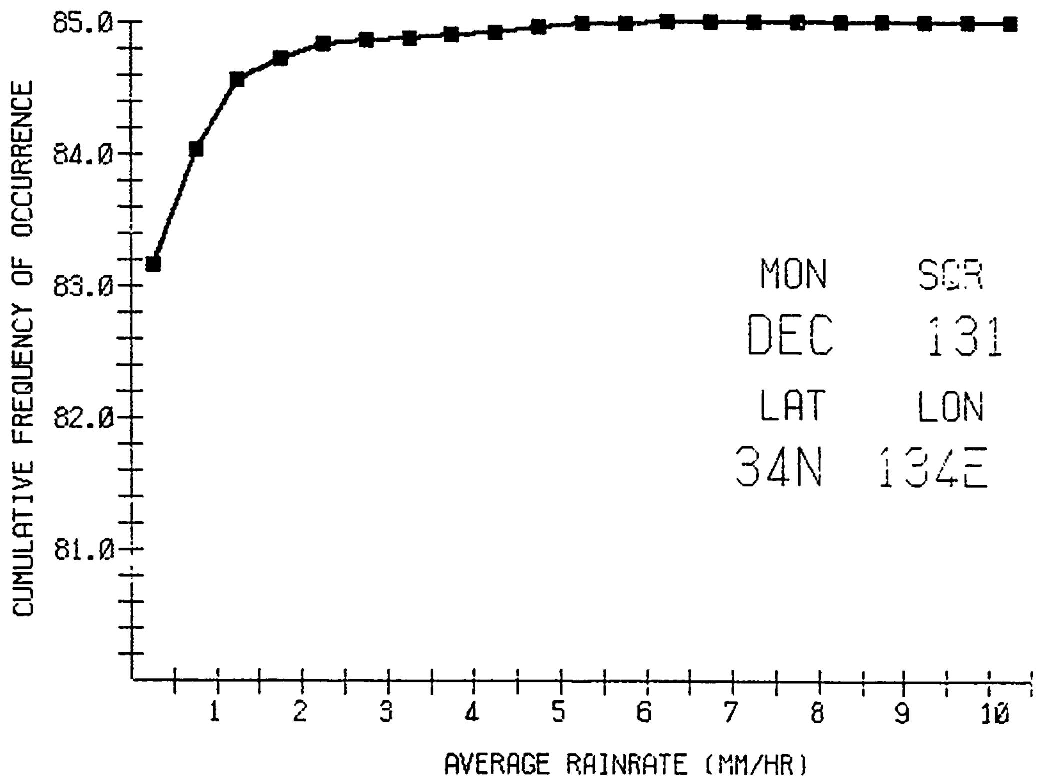
AVERAGE RAINRATE (MM/HR)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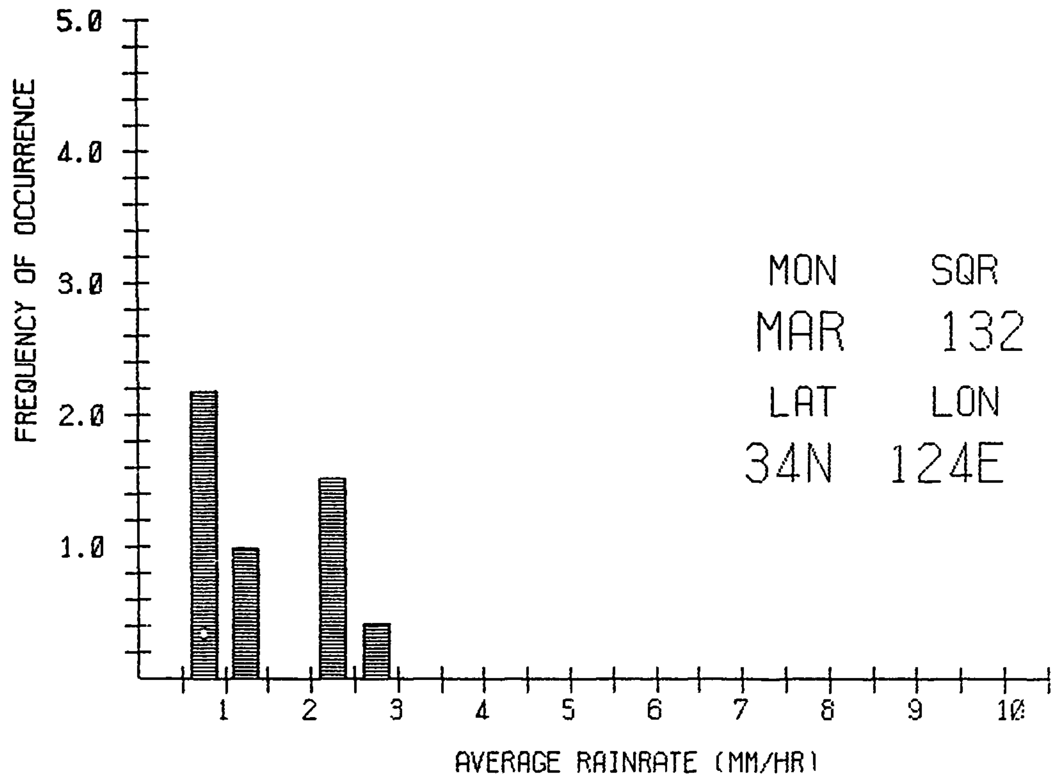
AVERAGE RAINRATE (MM/HR)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AVERAGE RAINRATE (MM/HR)
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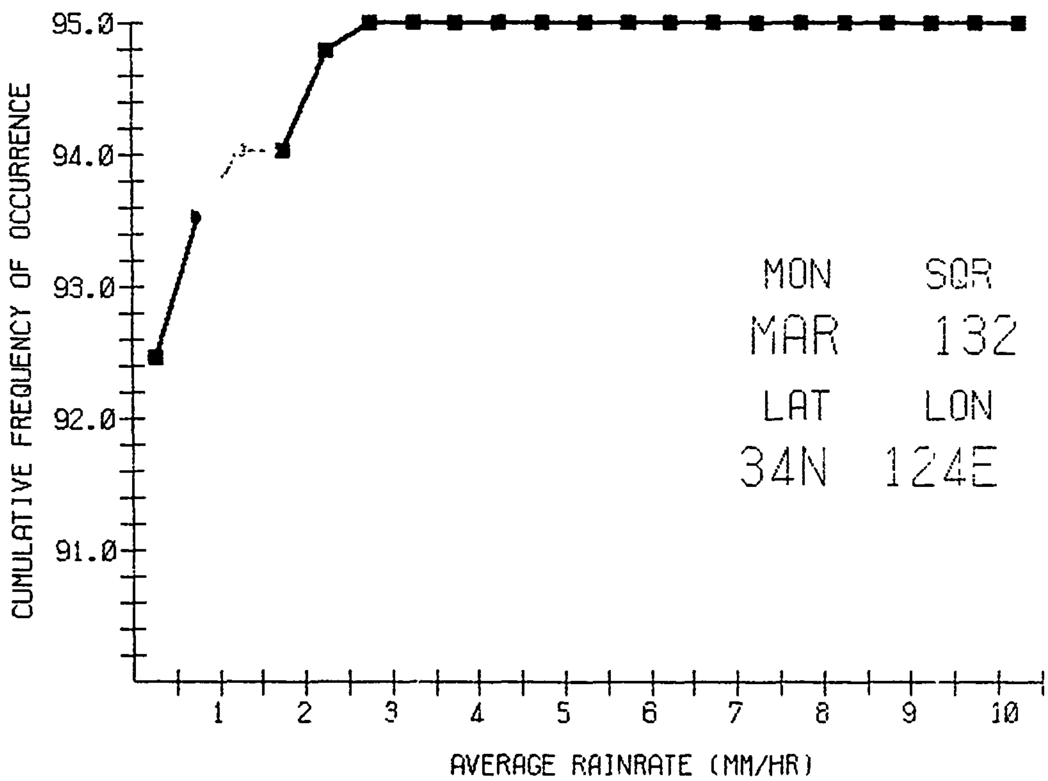
34N 124E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CUMULATIVE FREQUENCY OF OCCURRENCE
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AVERAGE RAINRATE (MM/HR)
MON SQR
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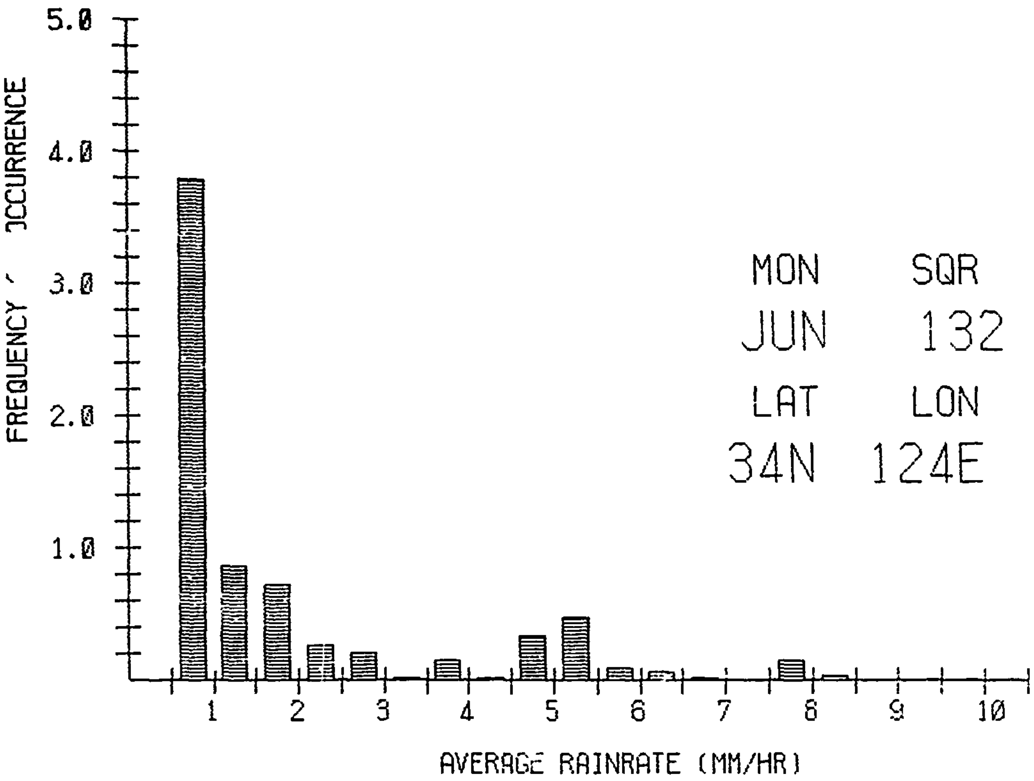
34N 124E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FREQUENCY OF OCCURRENCE
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AVERAGE RAINRATE (MM/HR)
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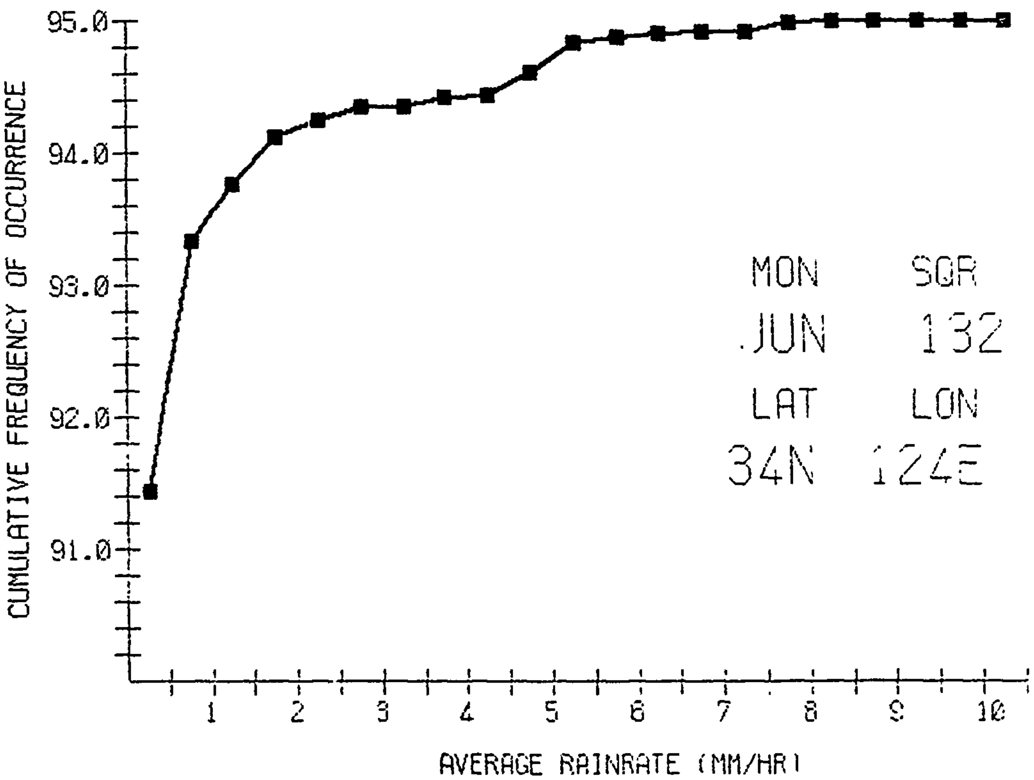
LAT LON
34N 124E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CUMULATIVE FREQUENCY OF OCCURRENCE
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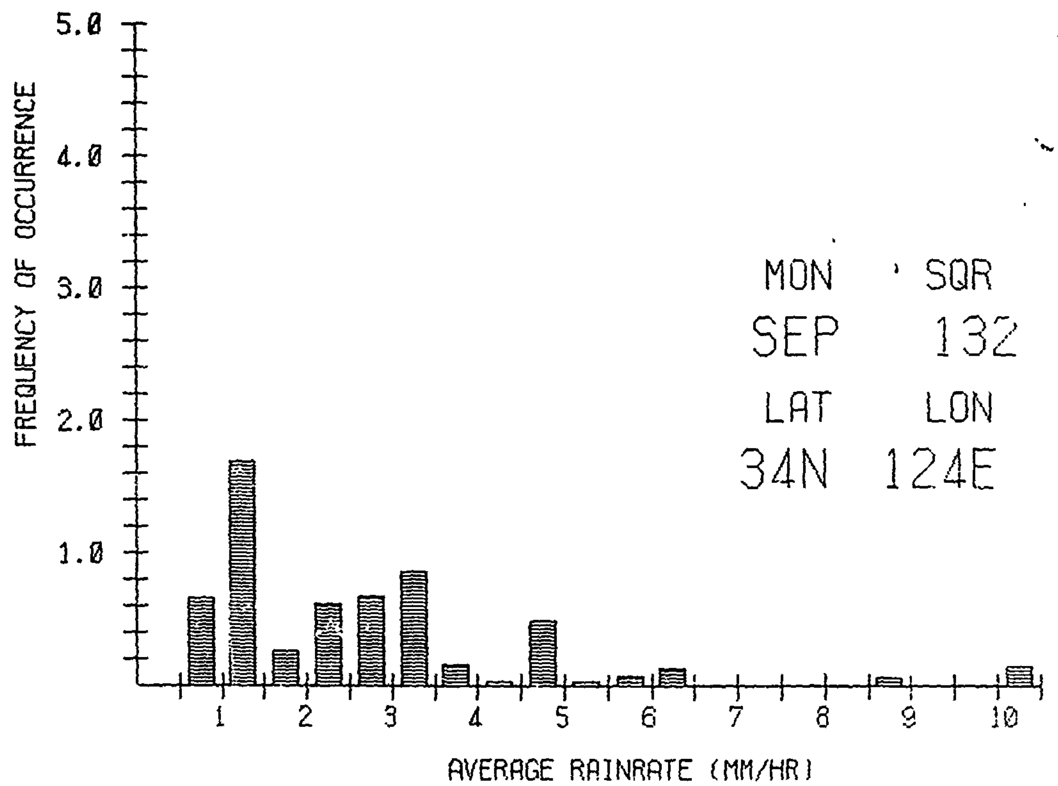
AVERAGE RAINRATE (MM/HR)
MON SQR
JUN 132
LAT LON
34N 124E



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FREQUENCY OF OCCURRENCE
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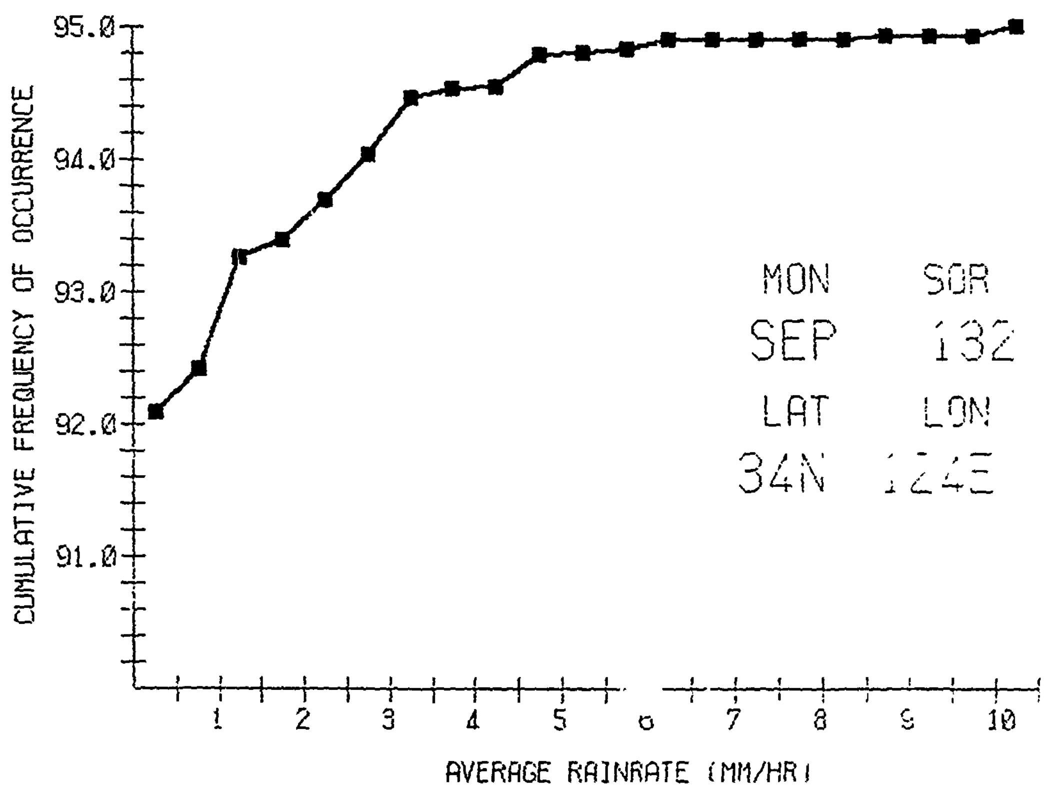
AVERAGE RAINRATE (MM/HR)



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CUMULATIVE FREQUENCY OF OCCURRENCE
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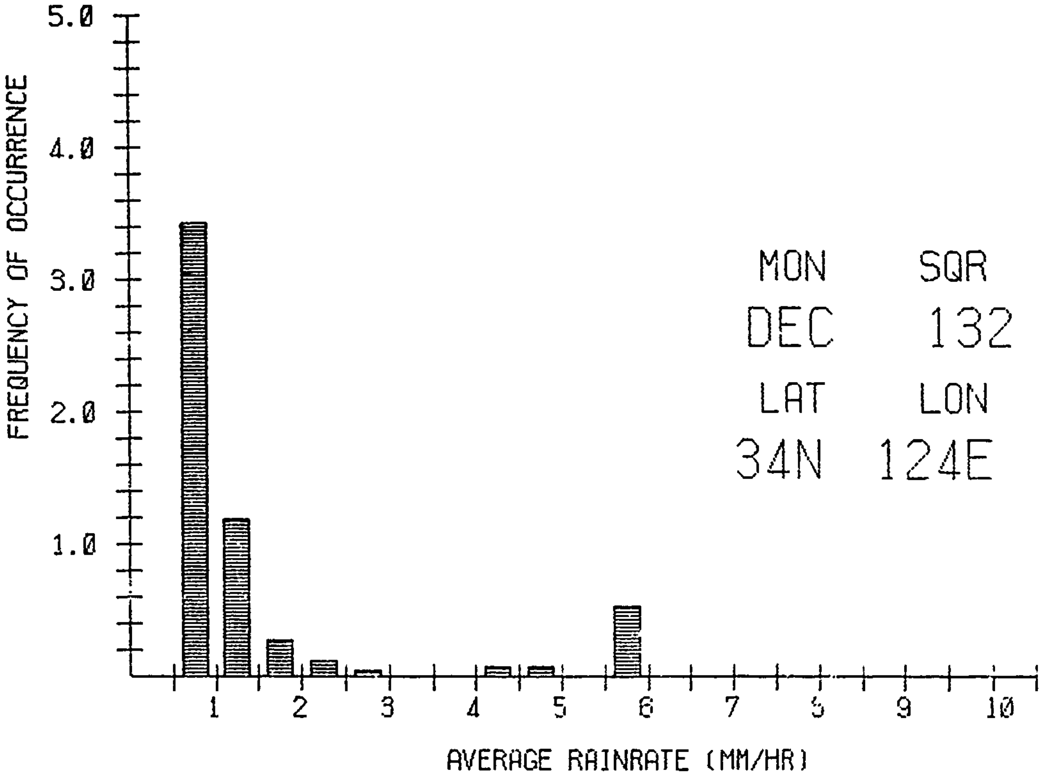
AVERAGE RAINRATE (MM/HR)



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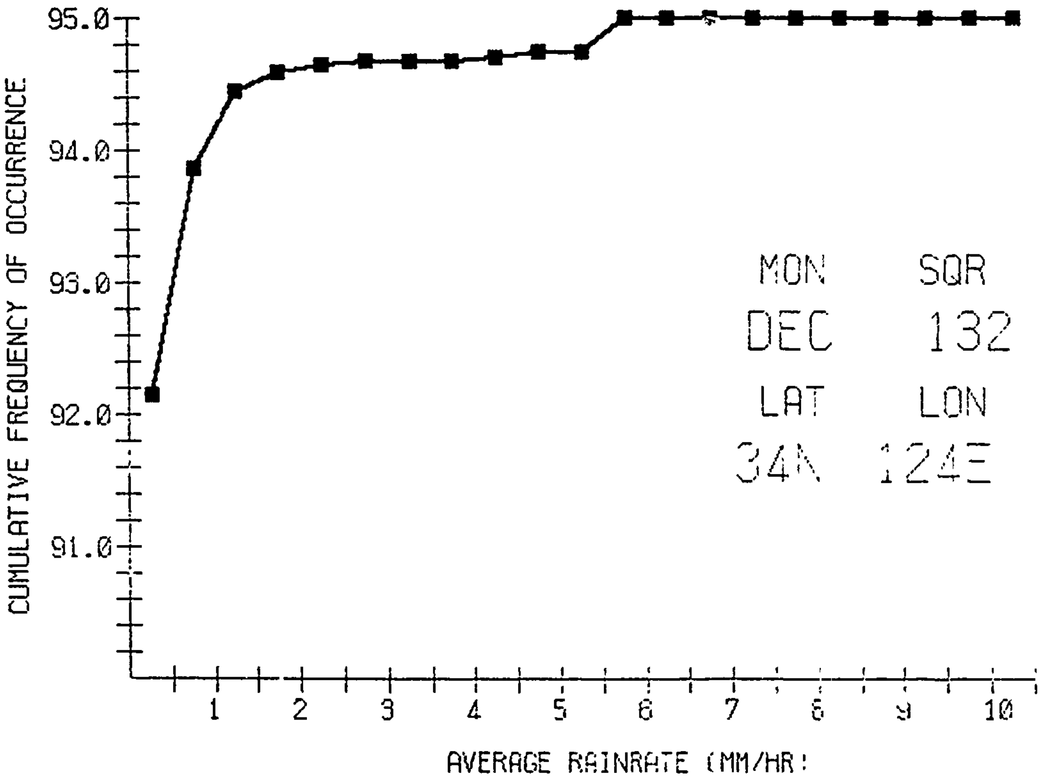
AVERAGE RAINRATE (MM/HR)



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CUMULATIVE FREQUENCY OF OCCURRENCE
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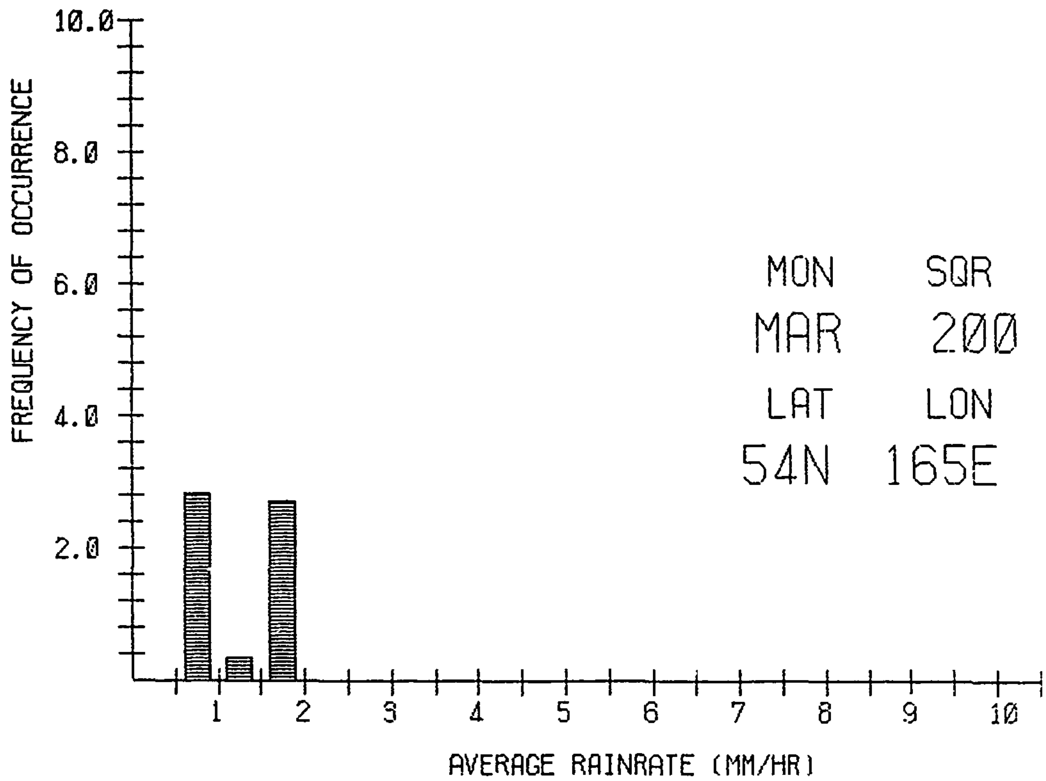
AVERAGE RAINRATE (MM/HR)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FREQUENCY OF OCCURRENCE
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AVERAGE RAINRATE (MM/HR)
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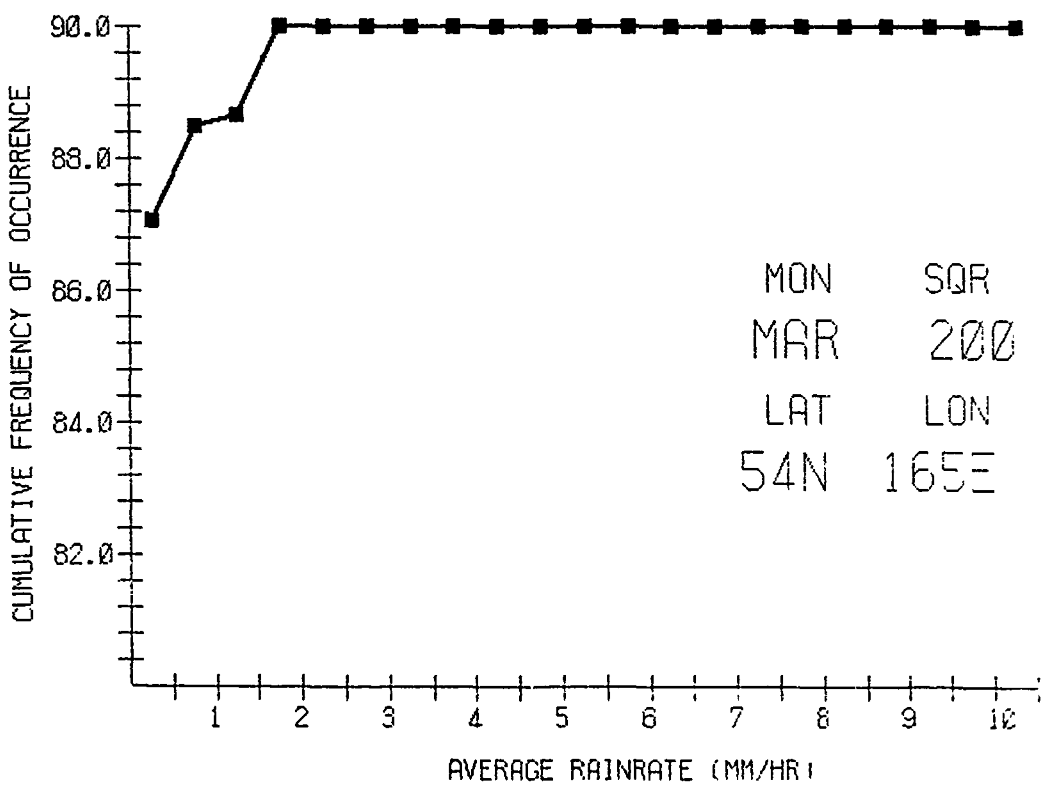
MAR 200
LAT LON
54N 165E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CUMULATIVE FREQUENCY OF OCCURRENCE
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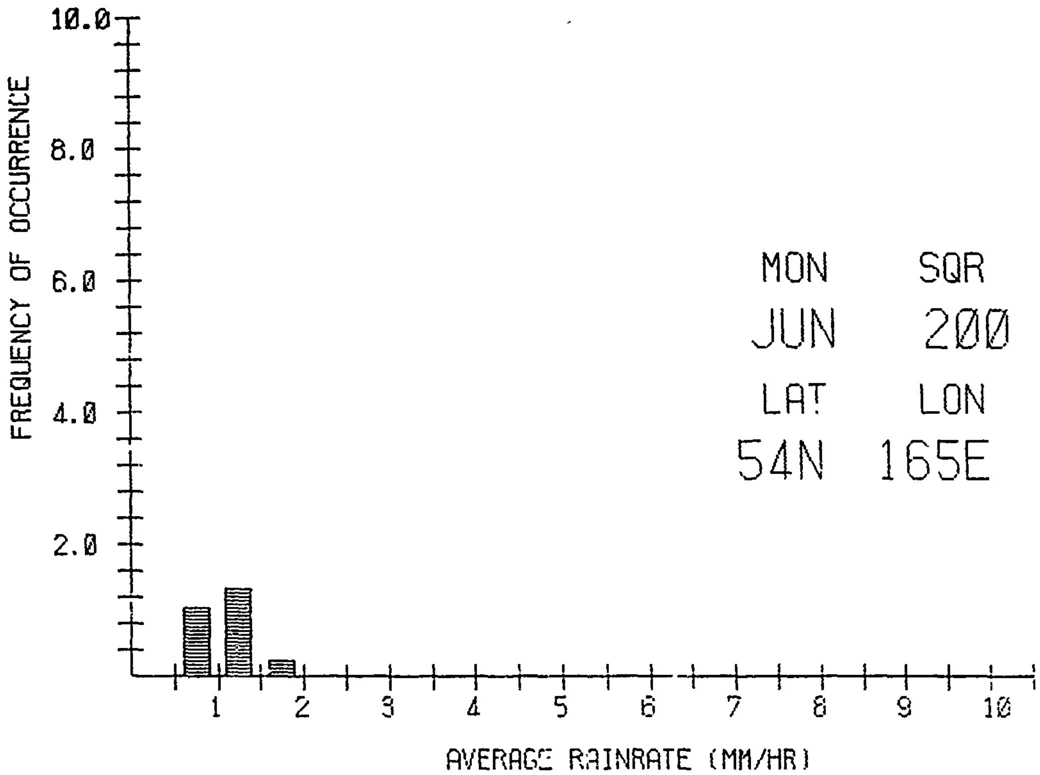
AVERAGE RAINRATE (MM/HR)
MON SQR
MAR 200
LAT LON
54N 165E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FREQUENCY OF OCCURRENCE
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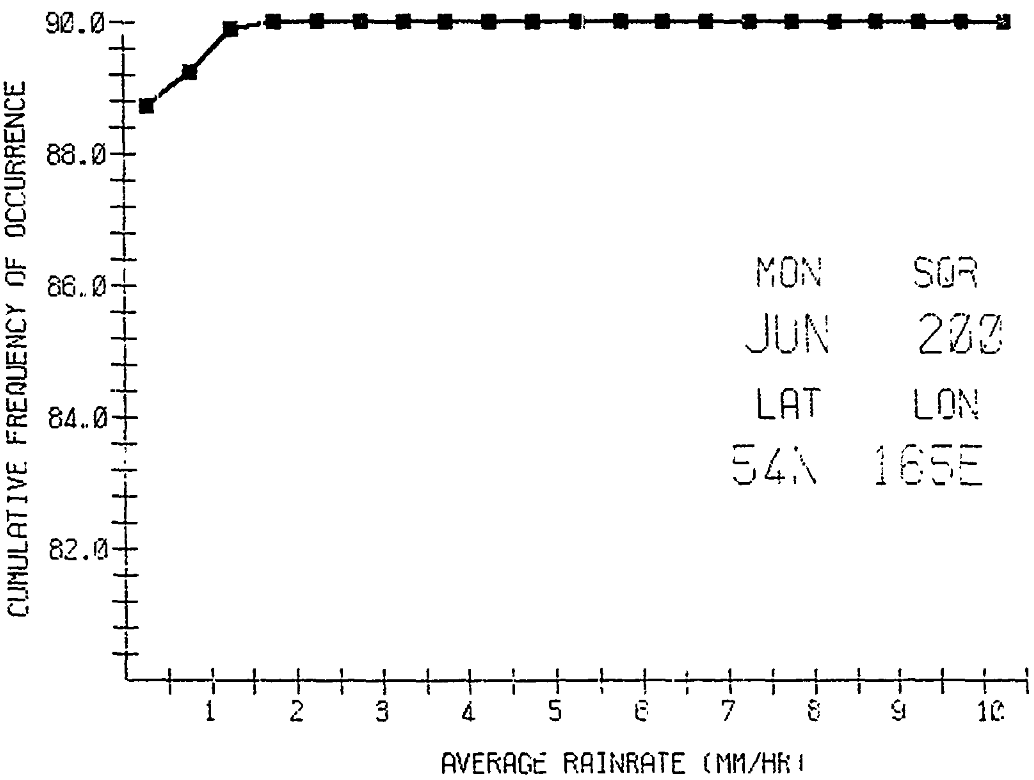
AVERAGE RAINRATE (MM/HR)
MON
SQR
JUN
200
LAT
LON
54N
165E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CUMULATIVE FREQUENCY OF OCCURRENCE
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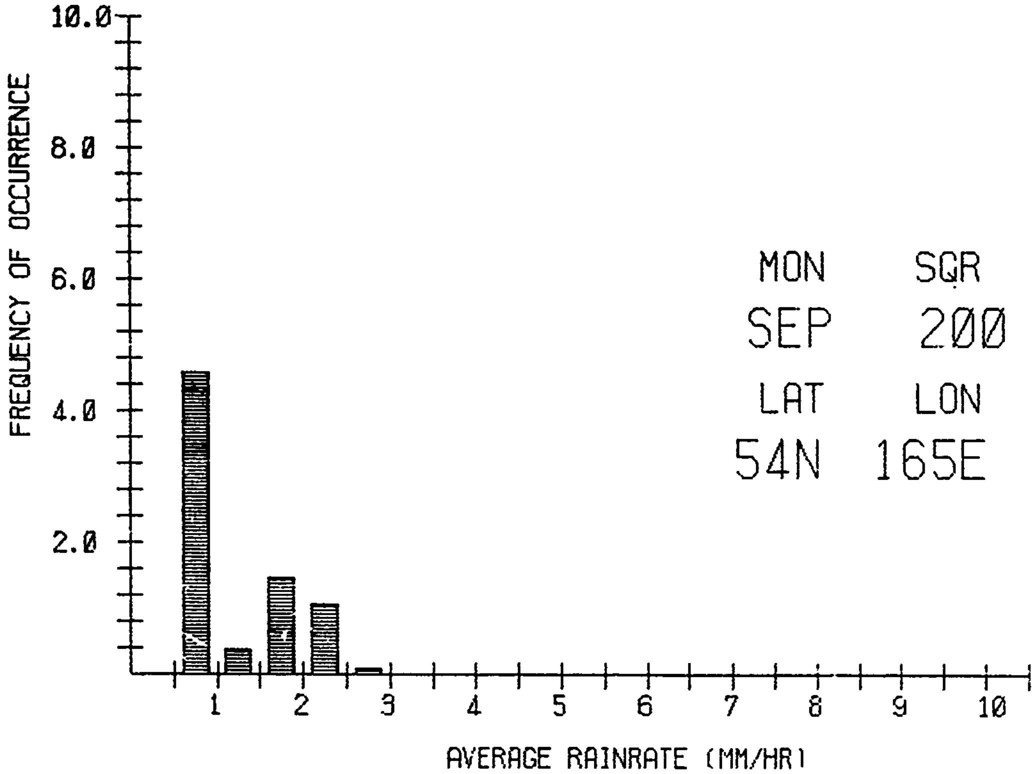
AVERAGE RAINRATE (MM/HR)
MON
SQR
JUN
200
LAT
LON
54N
165E



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FREQUENCY OF OCCURRENCE
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AVERAGE RAINRATE (MM/HR)
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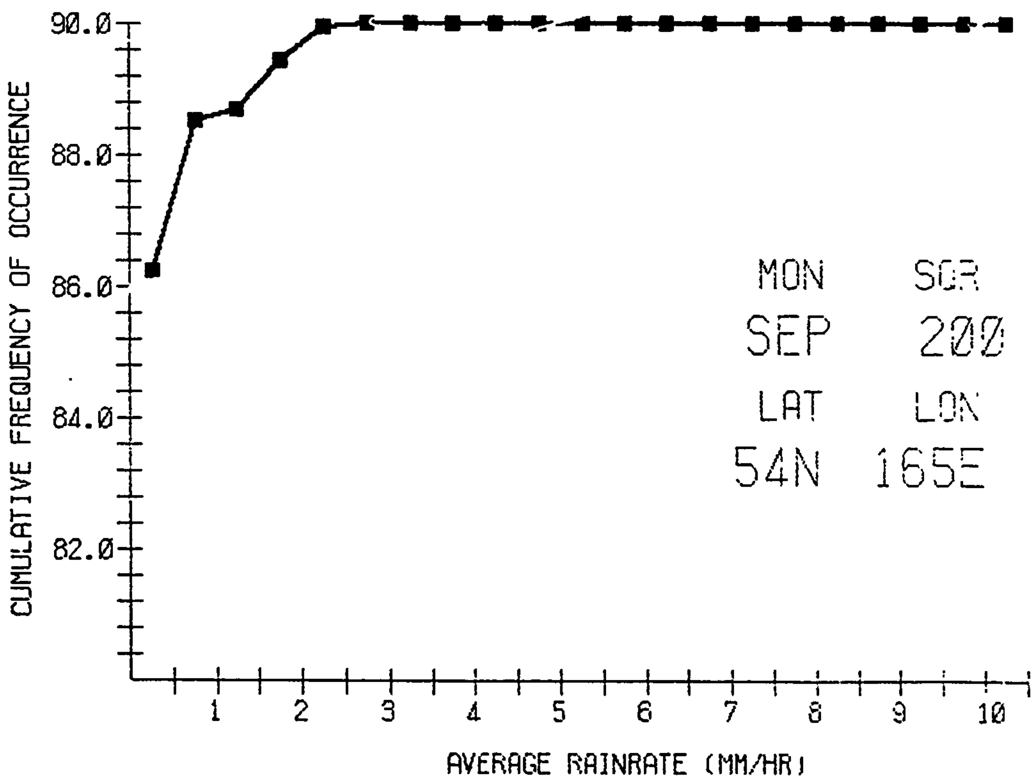
LAT LON
54N 165E



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CUMULATIVE FREQUENCY OF OCCURRENCE
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AVERAGE RAINRATE (MM/HR)
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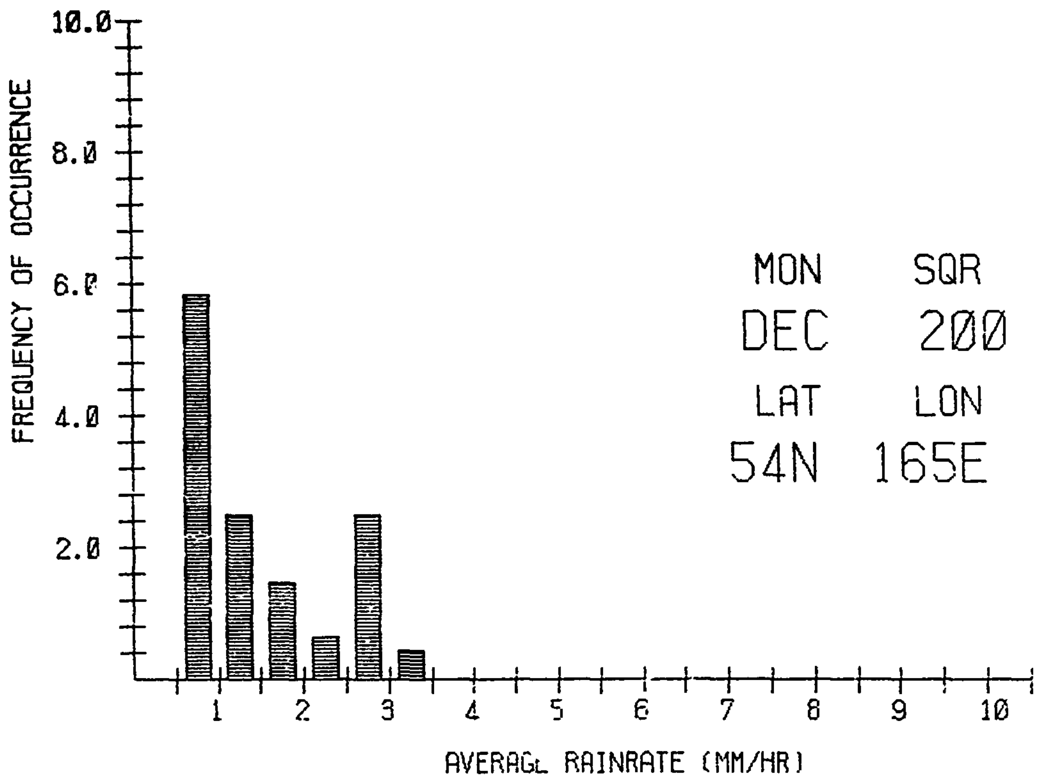
54N 165E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FREQUENCY OF OCCURRENCE
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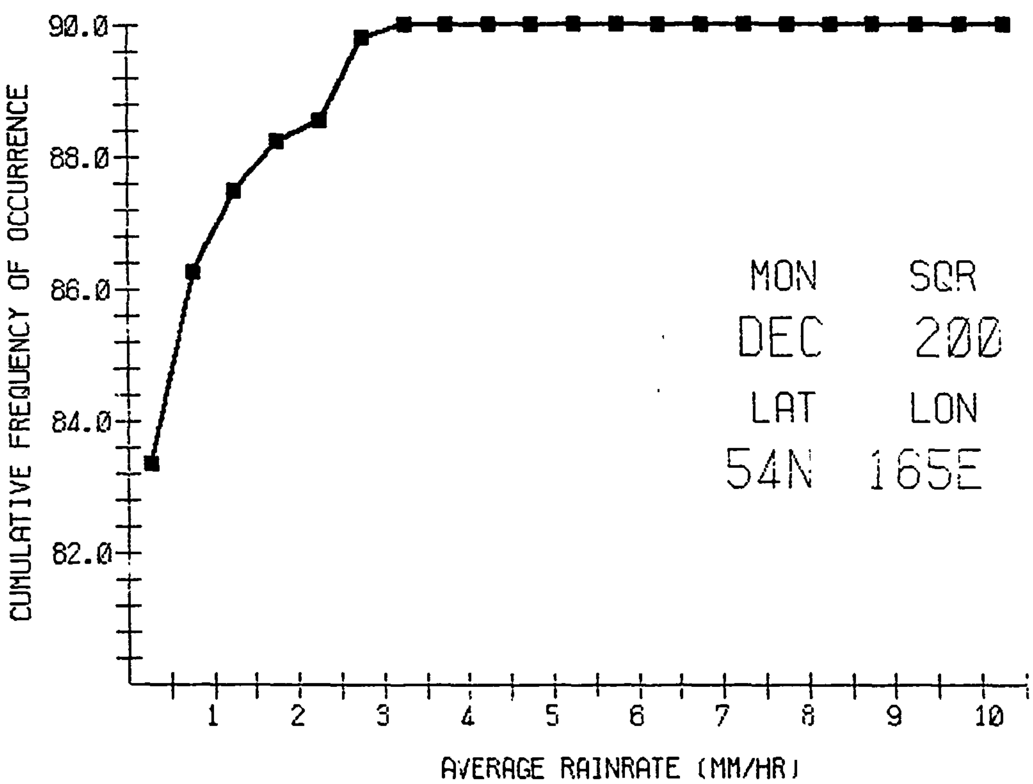
AVERAGE RAINRATE (MM/HR)
MON SQR
DEC 200
LAT LON
54N 165E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AVERAGE RAINRATE (MM/HR)
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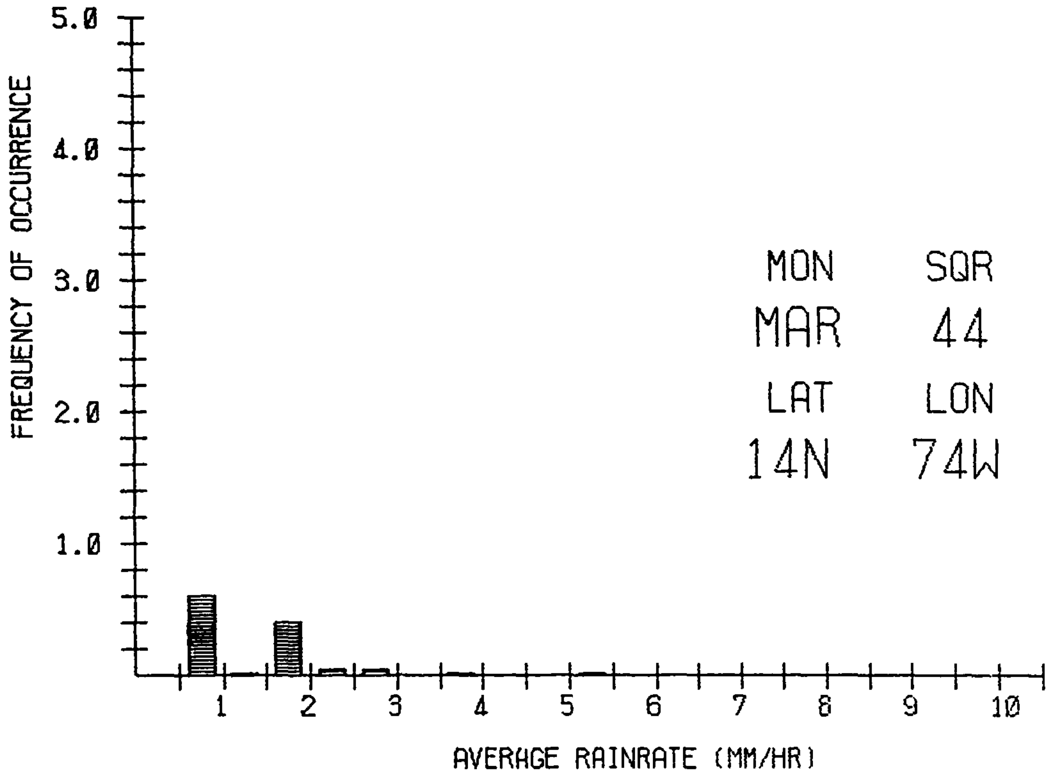
DEC 200
LAT LON
54N 165E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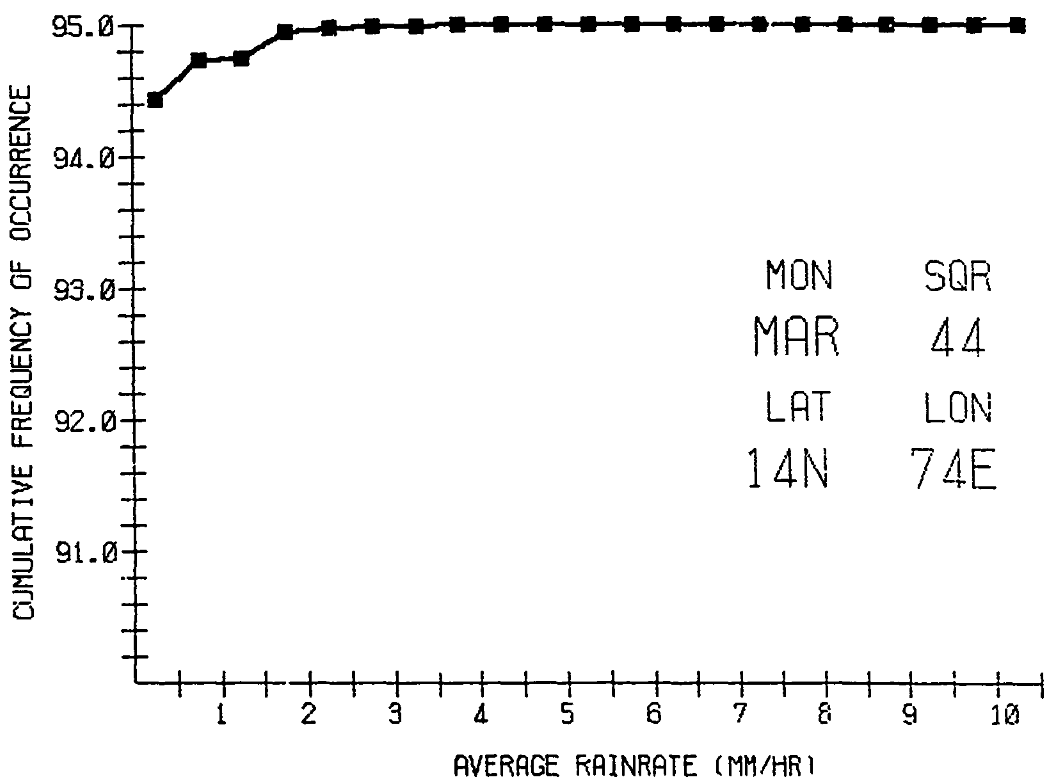
AVERAGE RAINRATE (MM/HR)
MON SQR
MAR 44
LAT LON
14N 74W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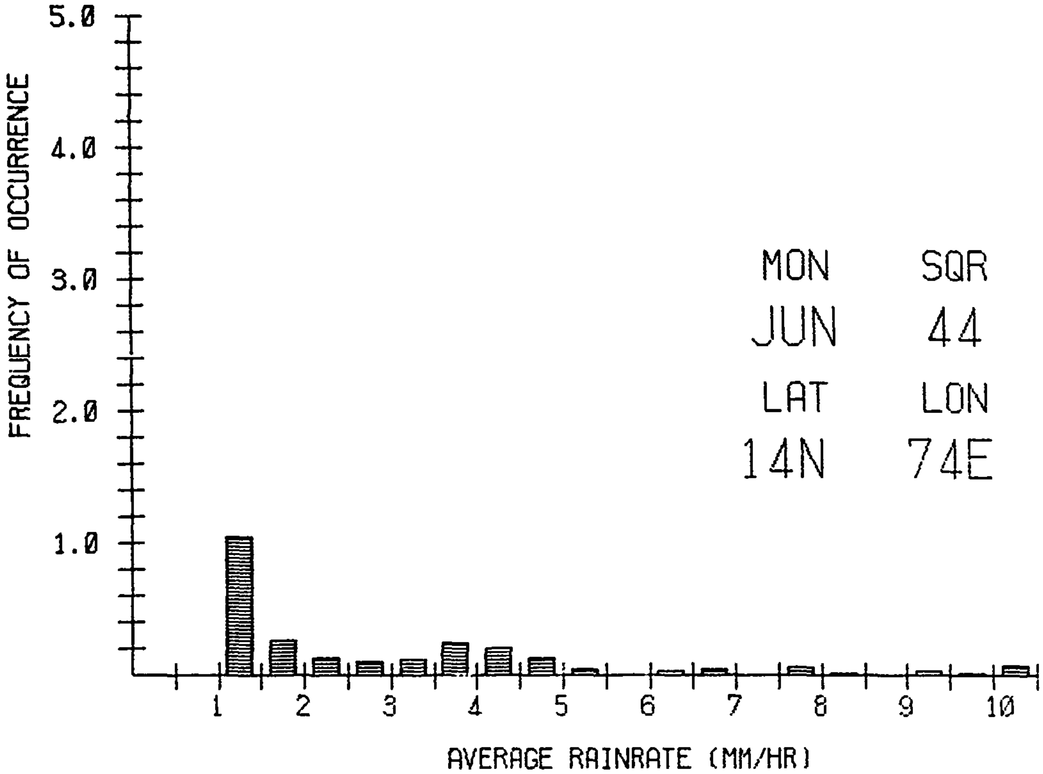
AVERAGE RAINRATE (MM/HR)
MON SQR
MAR 44
LAT LON
14N 74E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JUN 44
LAT LON
14N 74E
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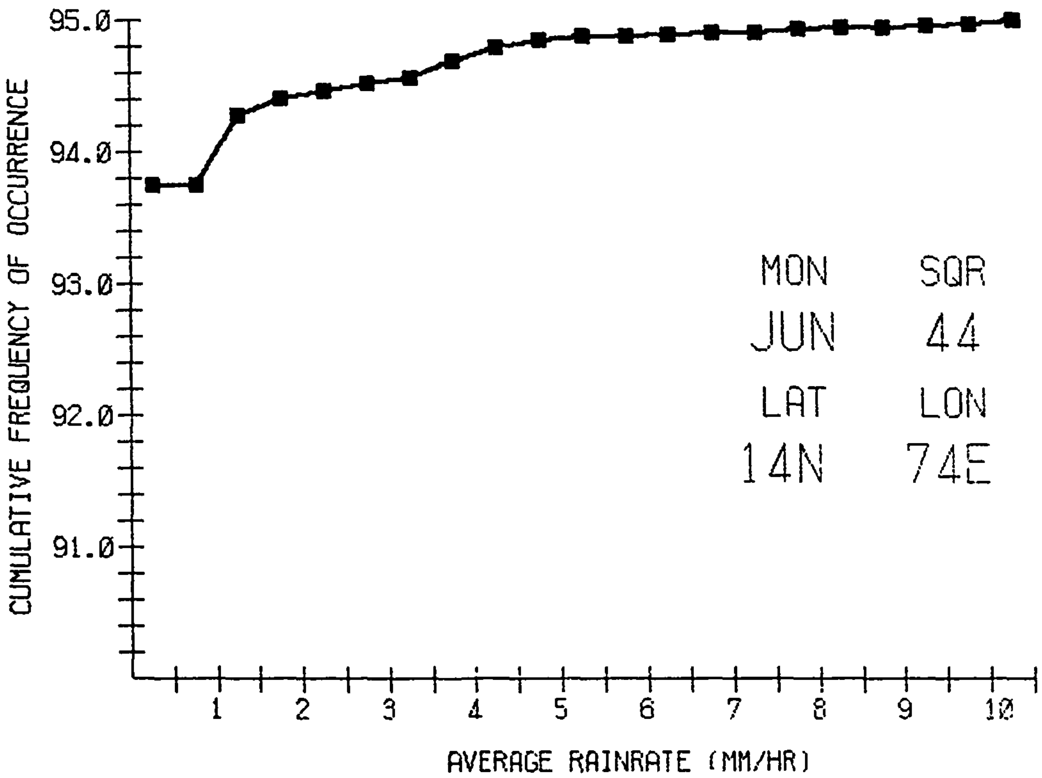
AVERAGE RAINRATE (MM/HR)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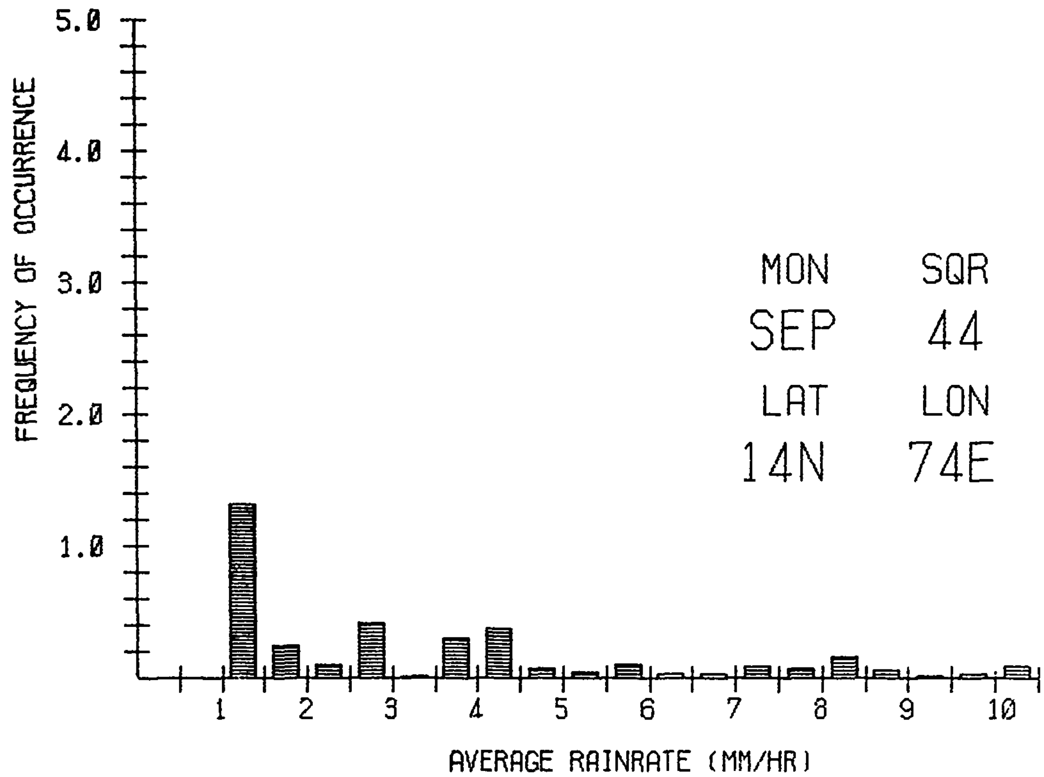
AVERAGE RAINRATE (MM/HR)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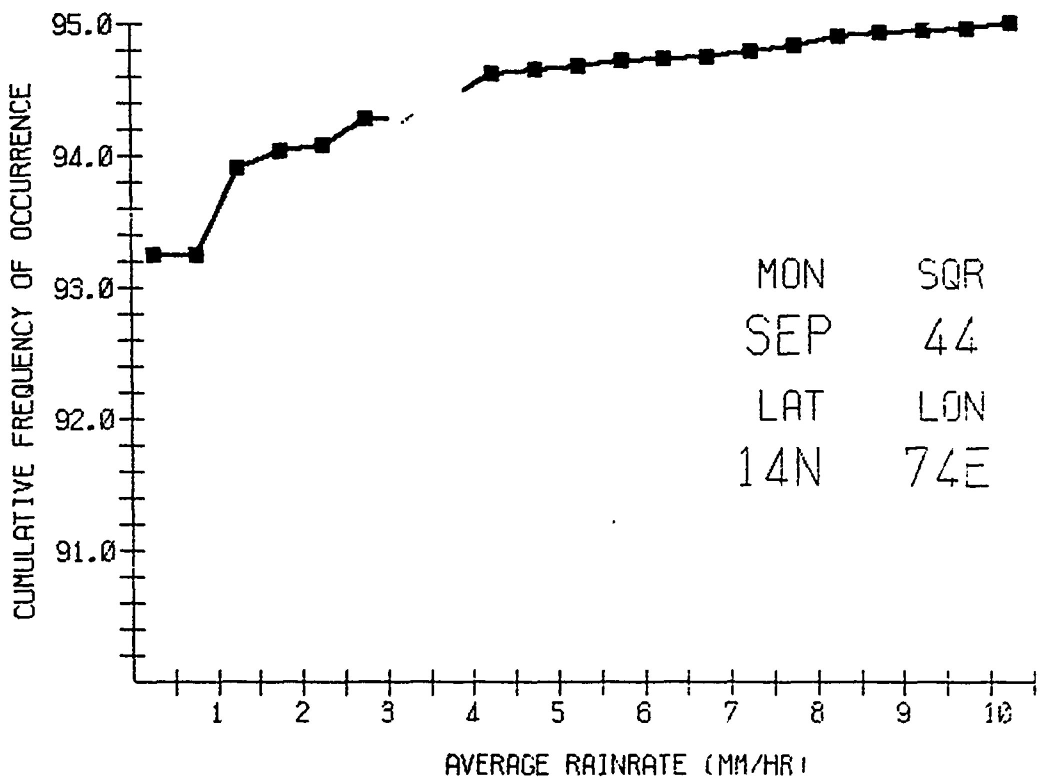
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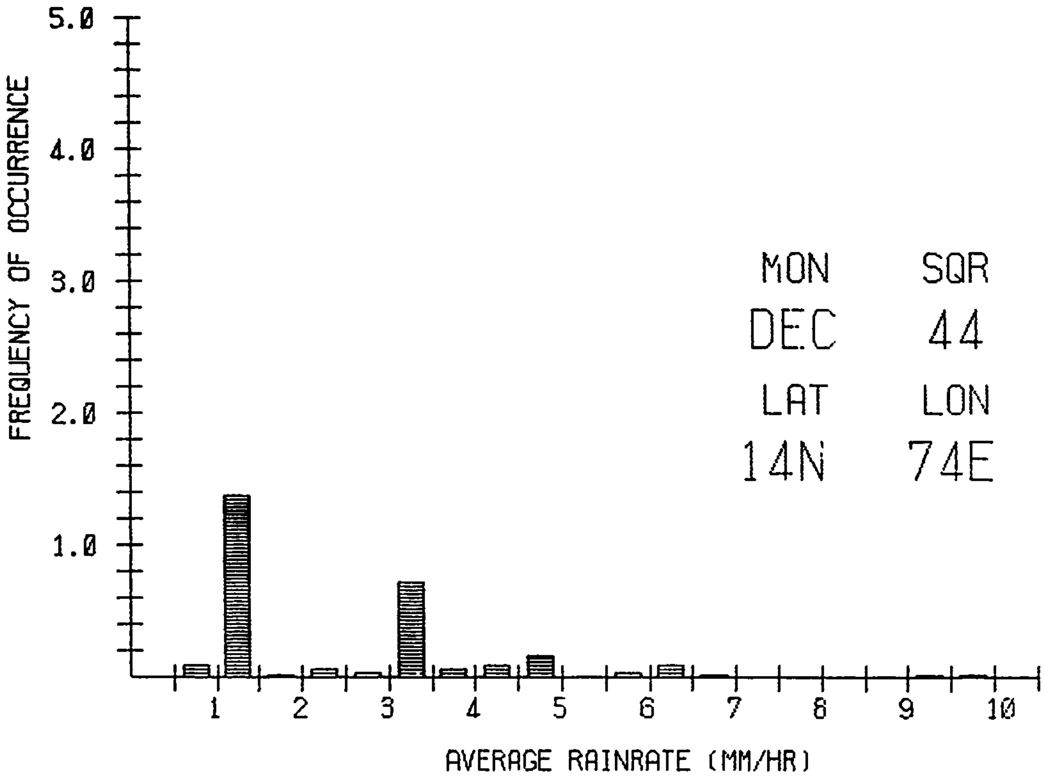
AVERAGE RAINRATE (MM/HR)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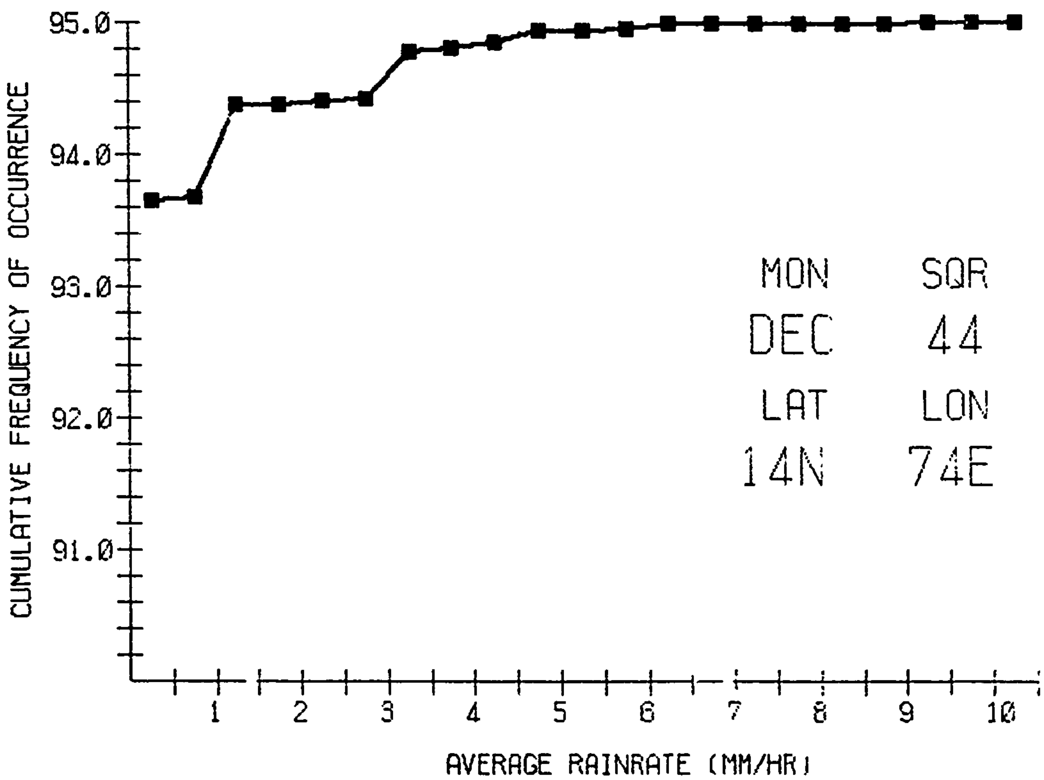
AVERAGE RAINRATE (MM/HR)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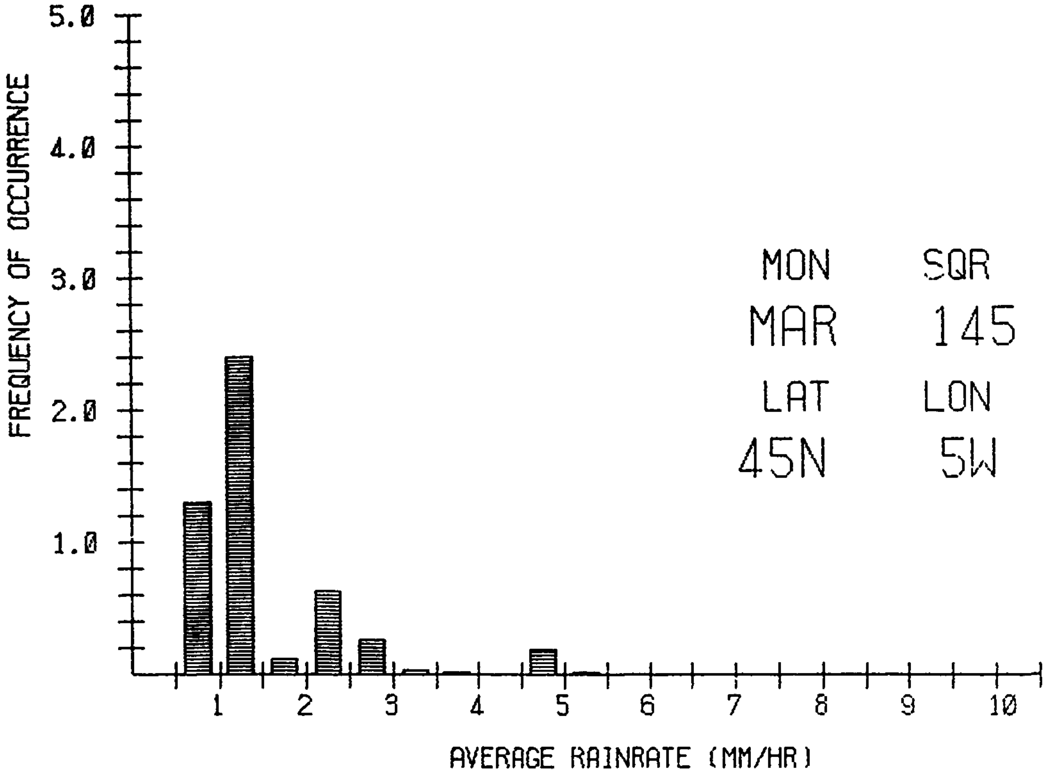
AVERAGE RAINRATE (MM/HR)



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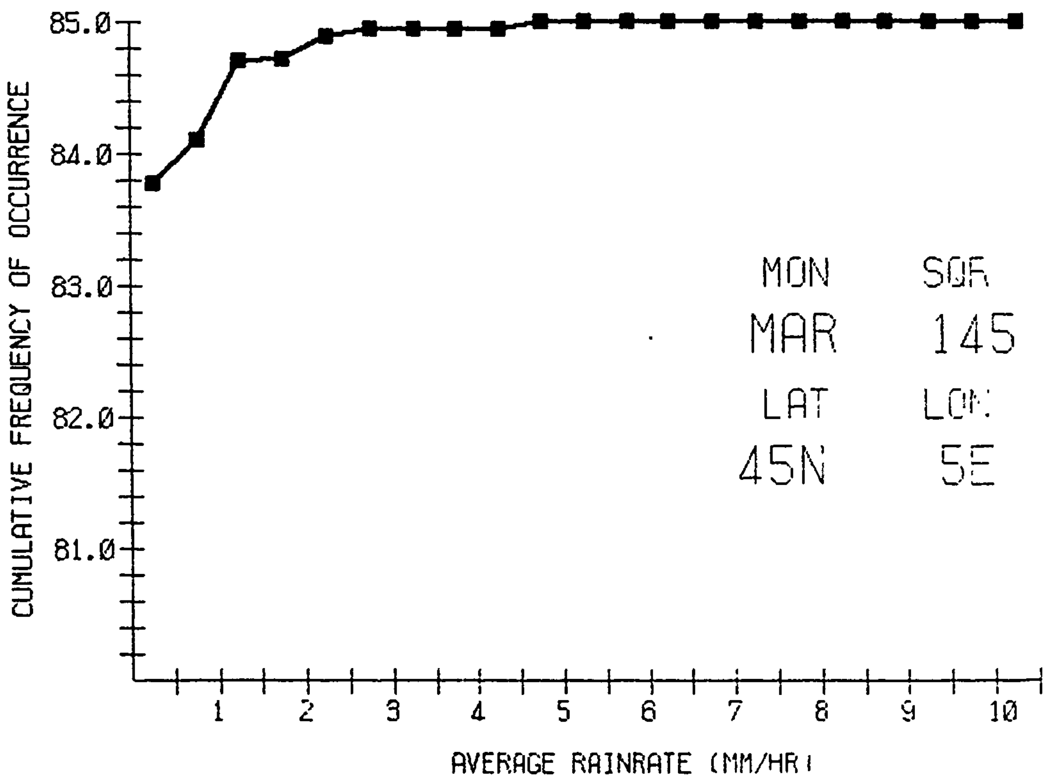
AVERAGE RAINRATE (MM/HR)
MON
SQR
MAR
145
LAT
LON
45N
5W



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MAR
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LAT
45N
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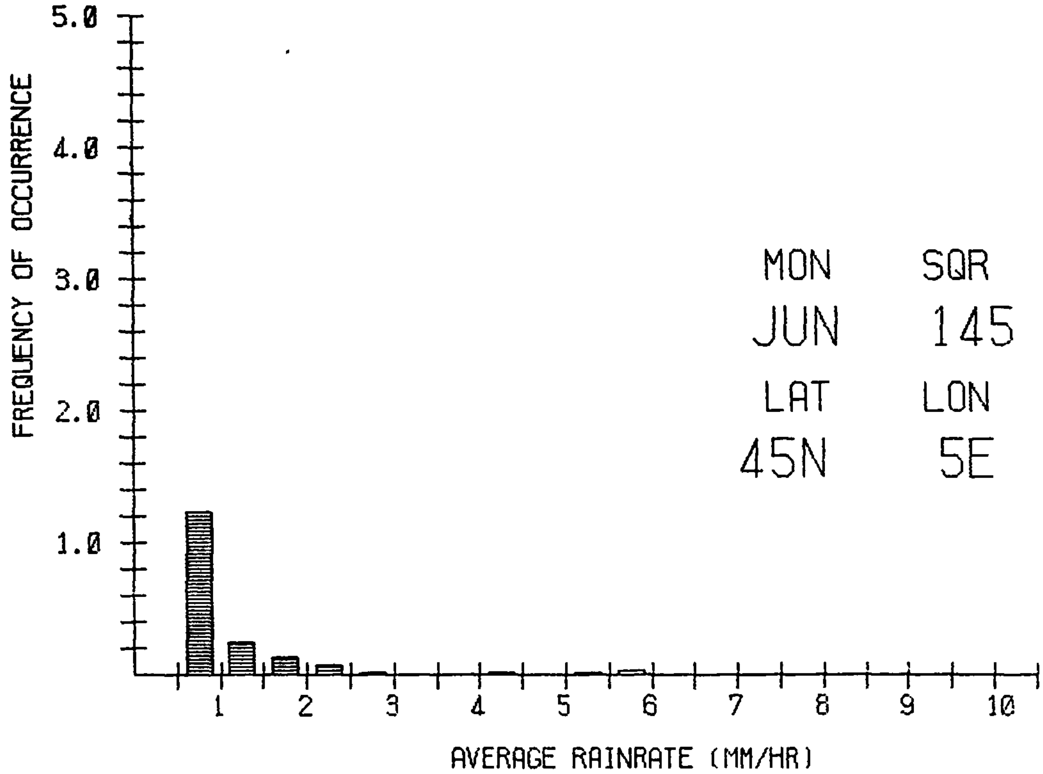

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JUN 145
LAT LON
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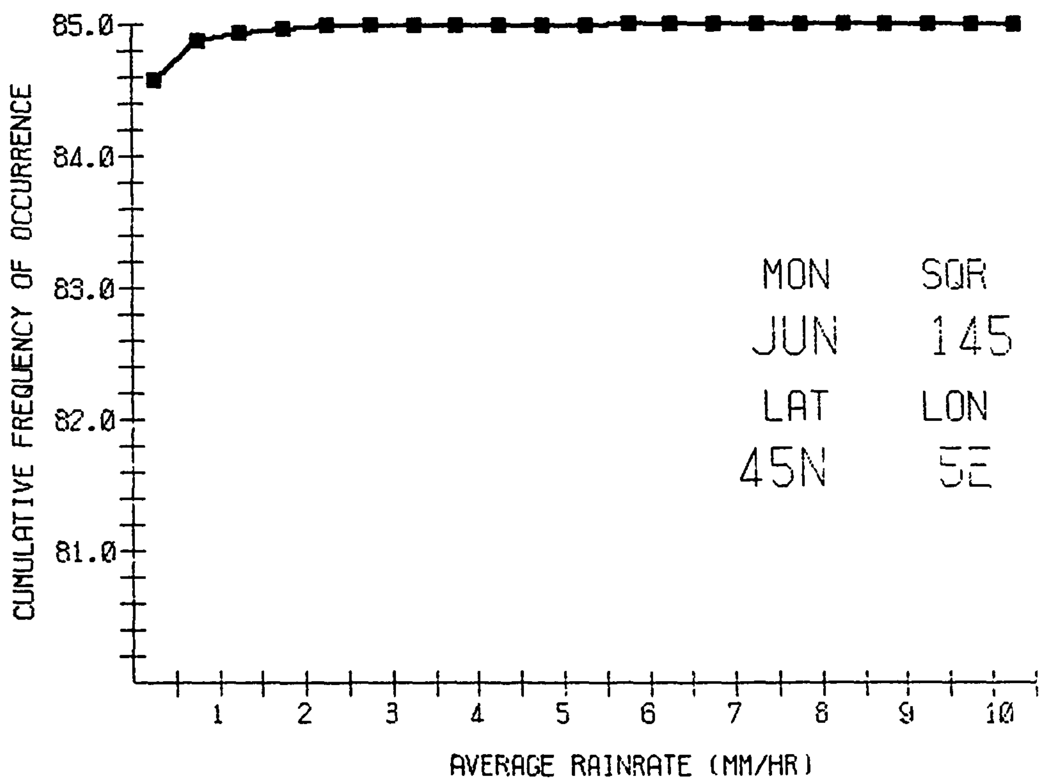
AVERAGE RAINRATE (MM/HR)



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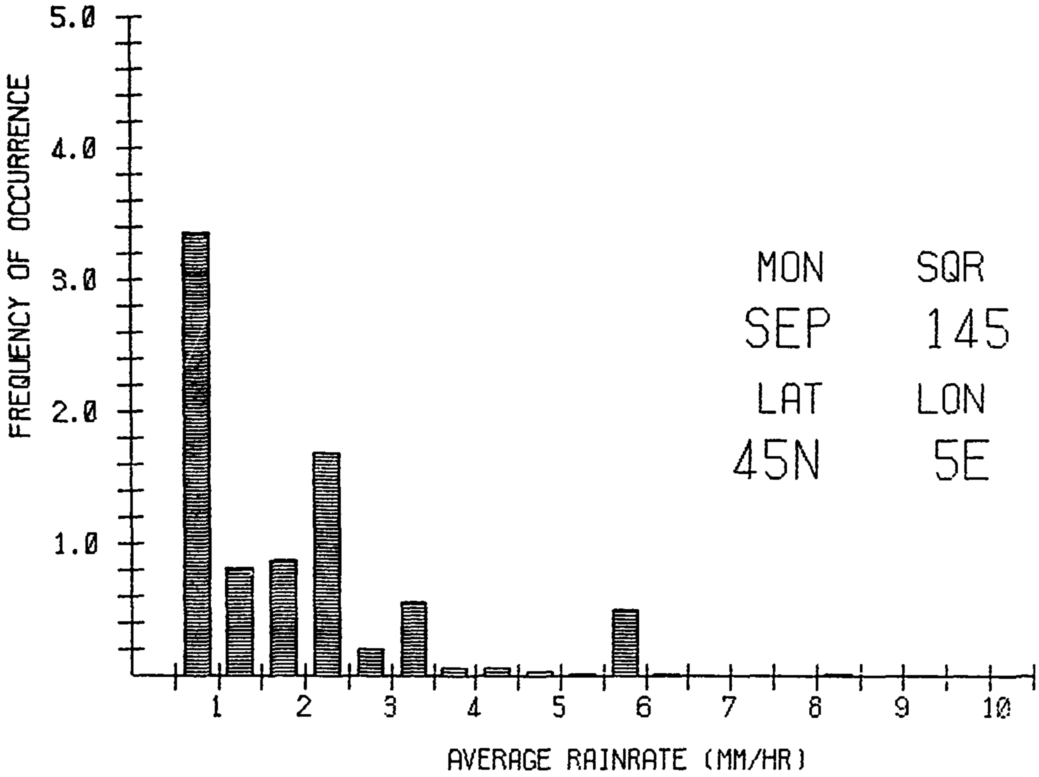
AVERAGE RAINRATE (MM/HR)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AVERAGE RAINRATE (MM/HR)
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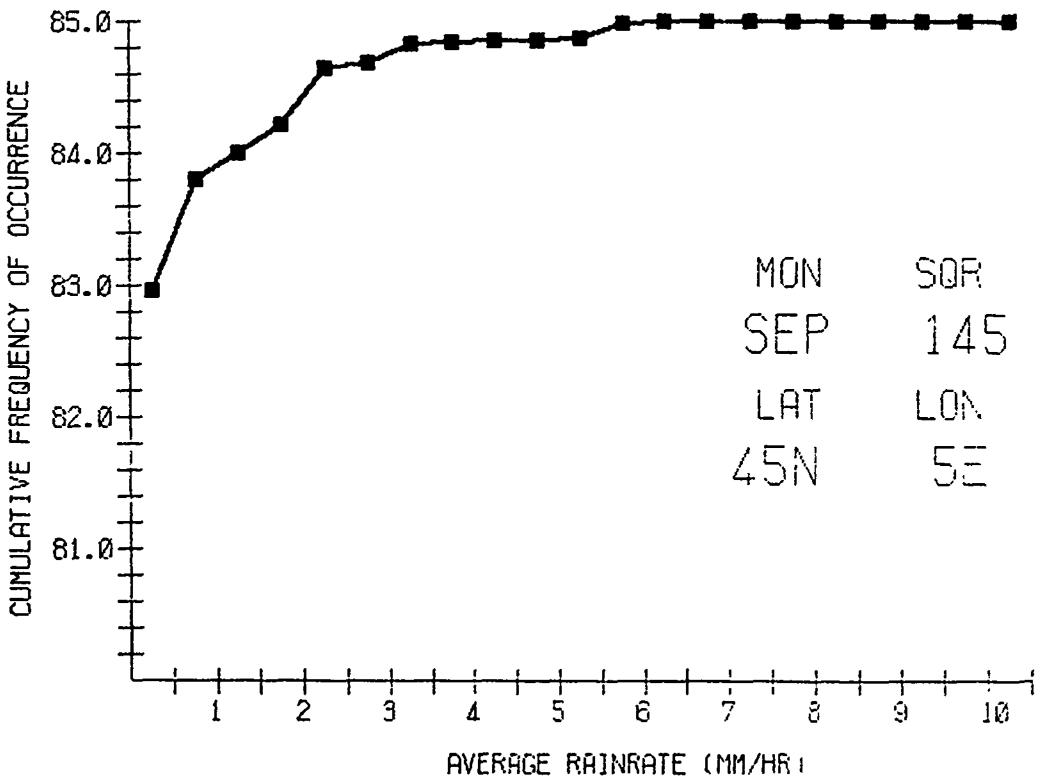
LAT LON
45N 5E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CUMULATIVE FREQUENCY OF OCCURRENCE
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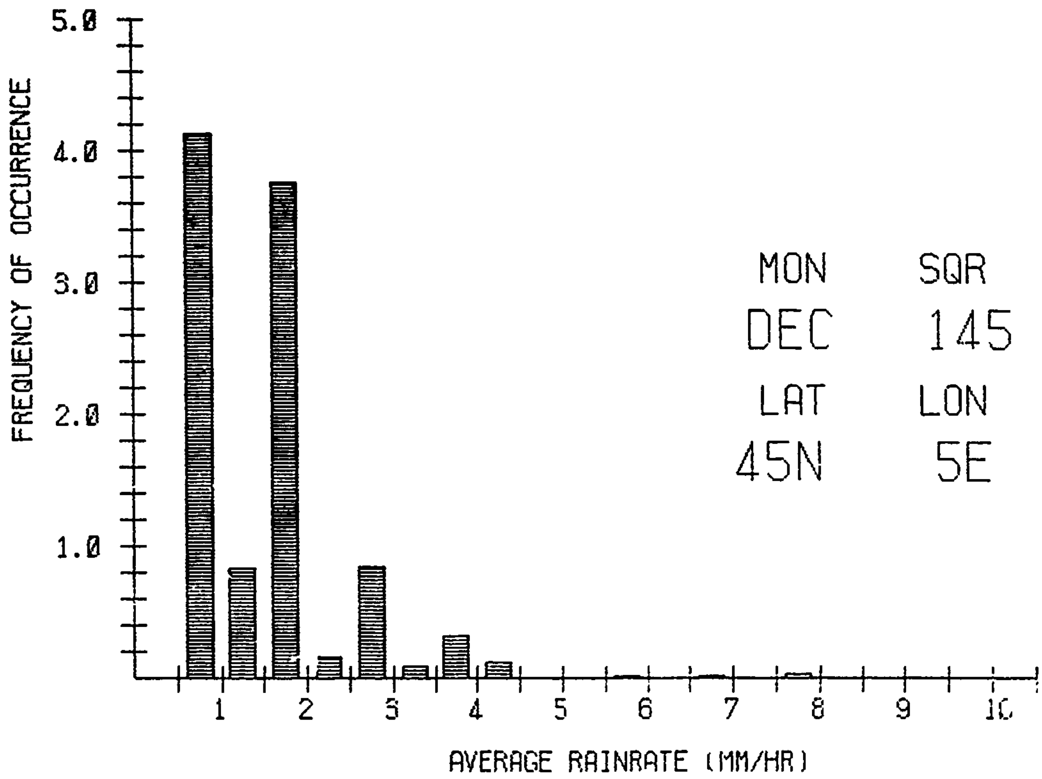
SEP 145
LAT
45N



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FREQUENCY OF OCCURRENCE
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AVERAGE RAINRATE (MM/HR)
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SQR
DEC
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LAT
LON
45N
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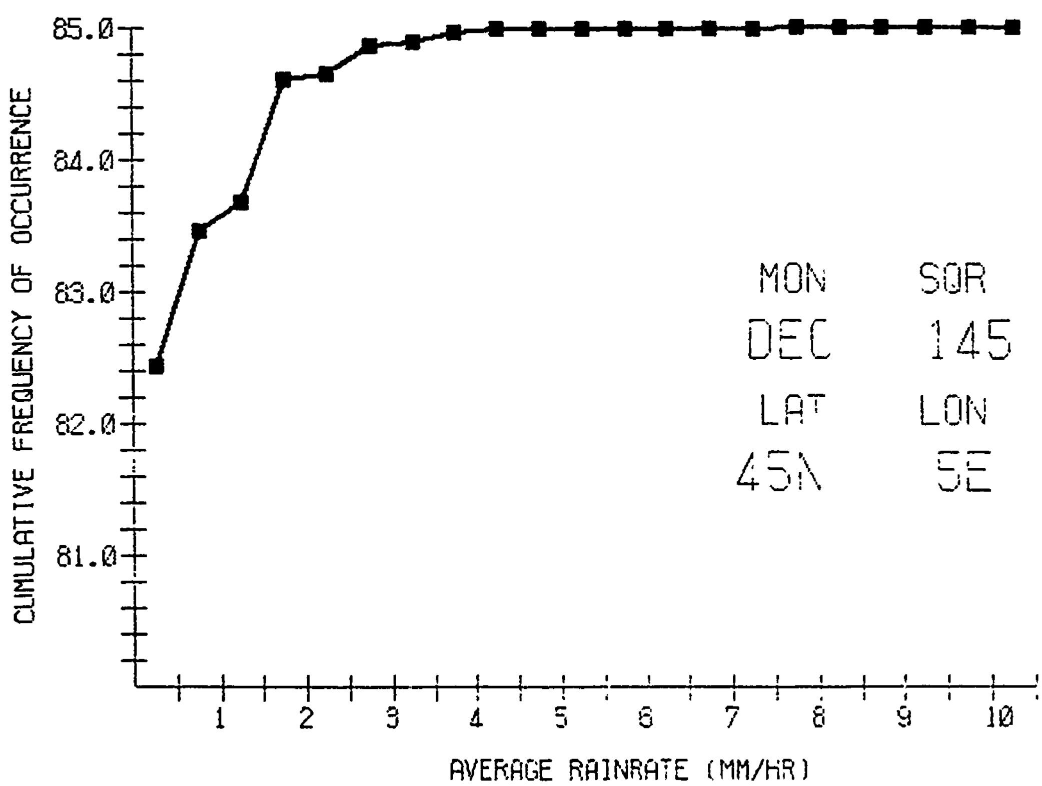

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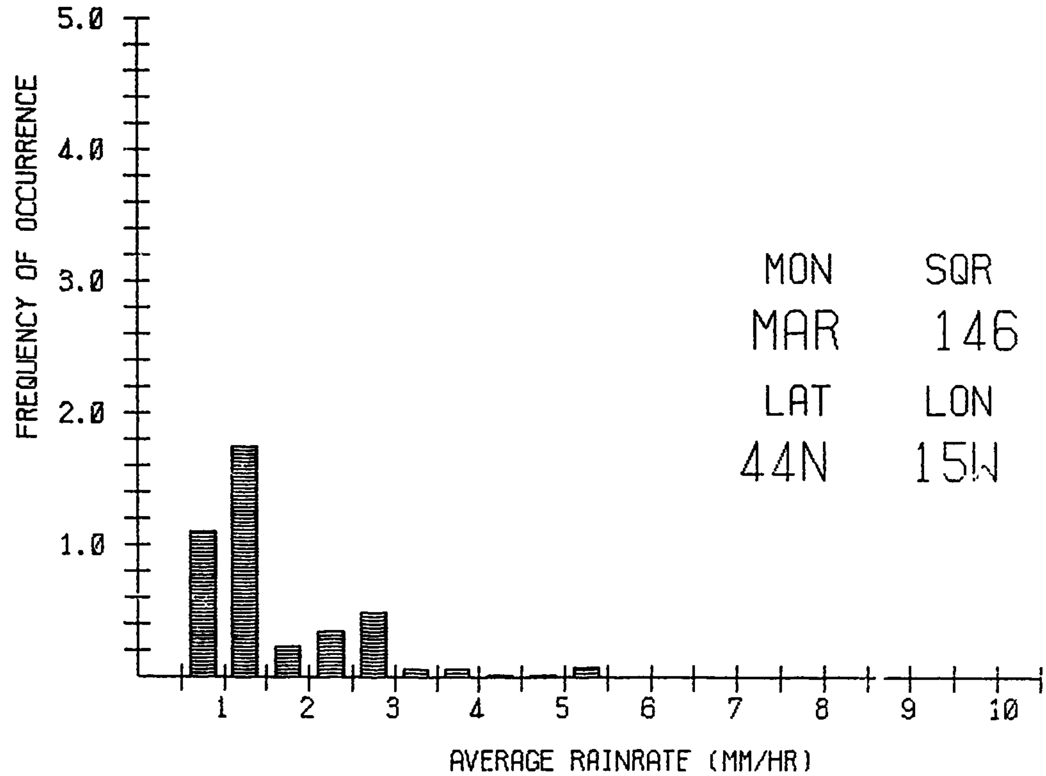
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MAR
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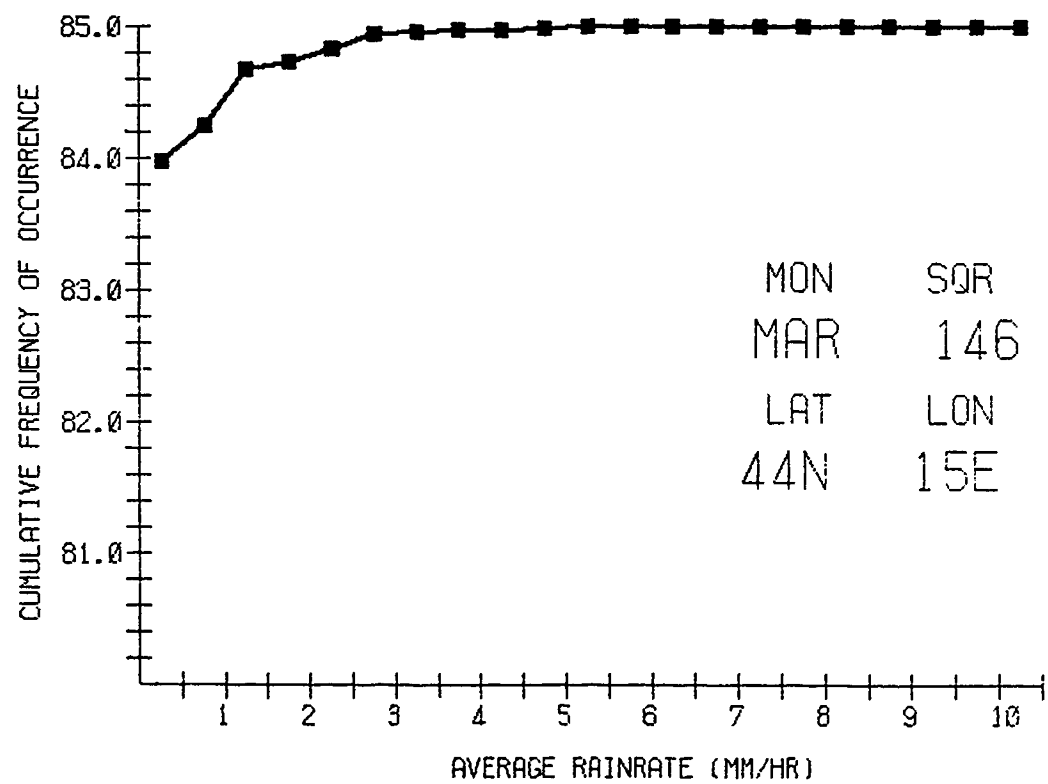
LAT
LON
44N
15W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AVERAGE RAINRATE (MM/HR)
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MAR
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LAT
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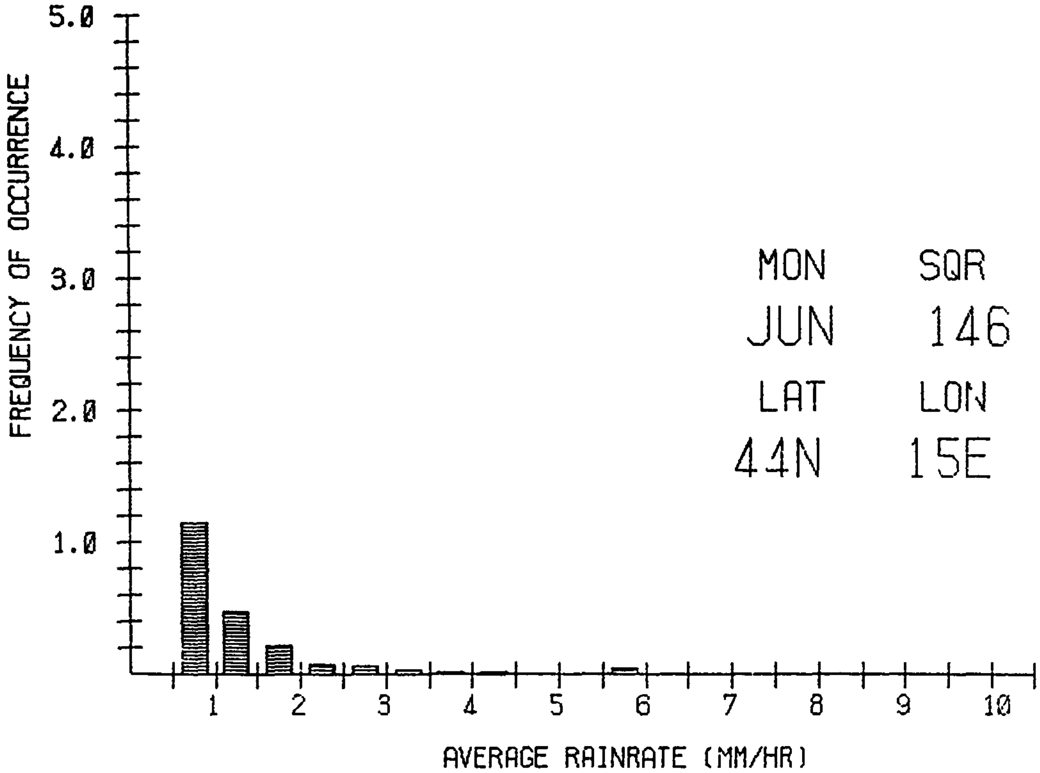
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LAT LON
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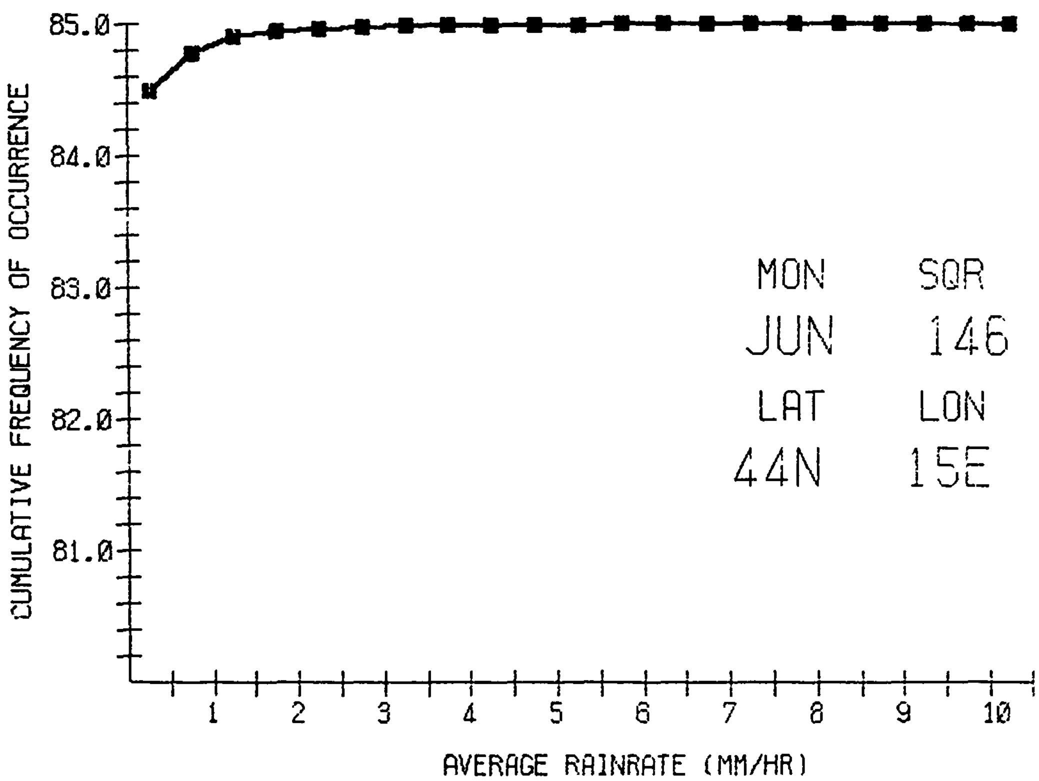
AVERAGE RAINRATE (MM/HR)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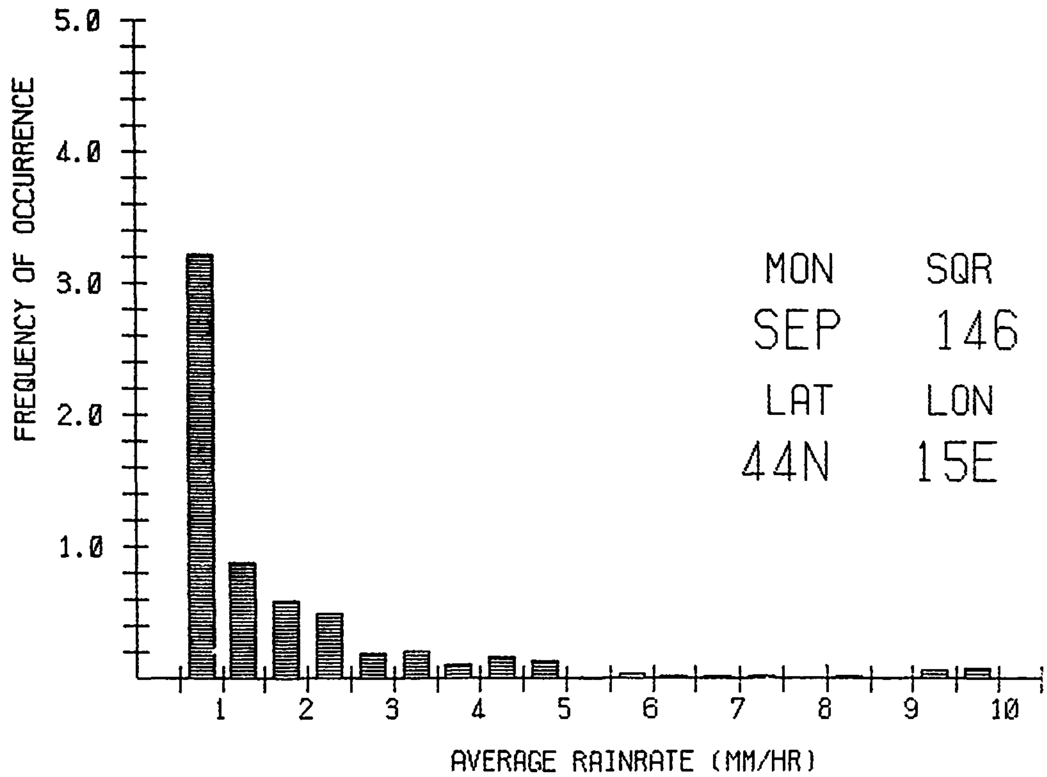
AVERAGE RAINRATE (MM/HR)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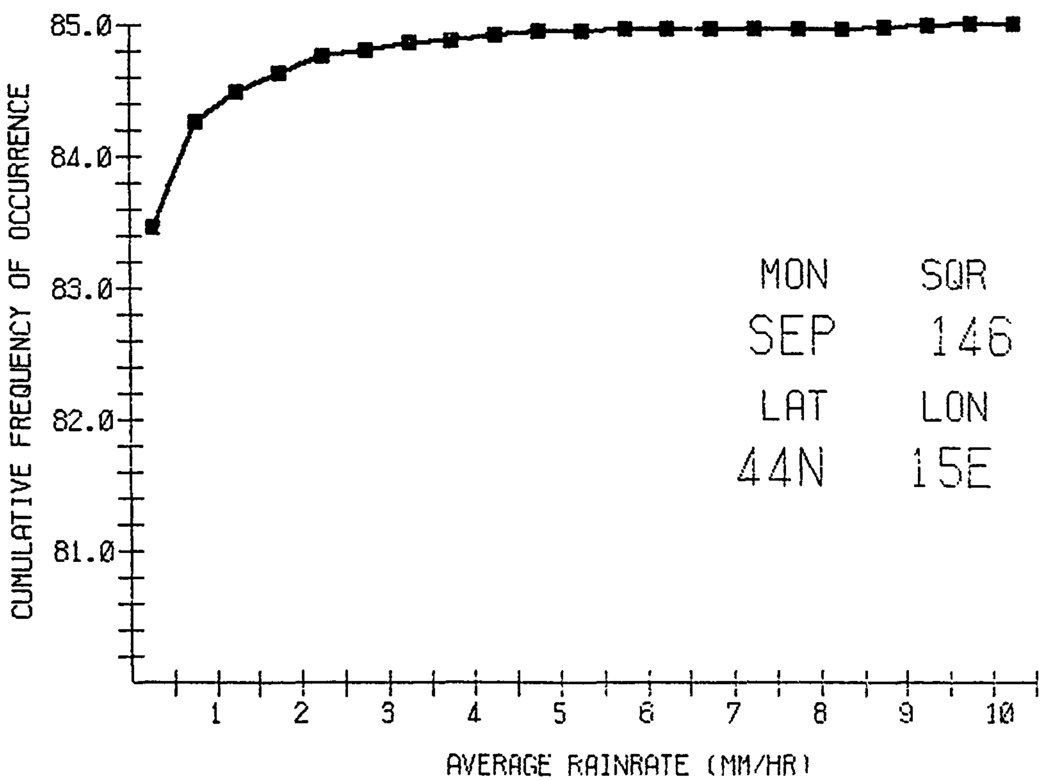
AVERAGE RAINRATE (MM/HR)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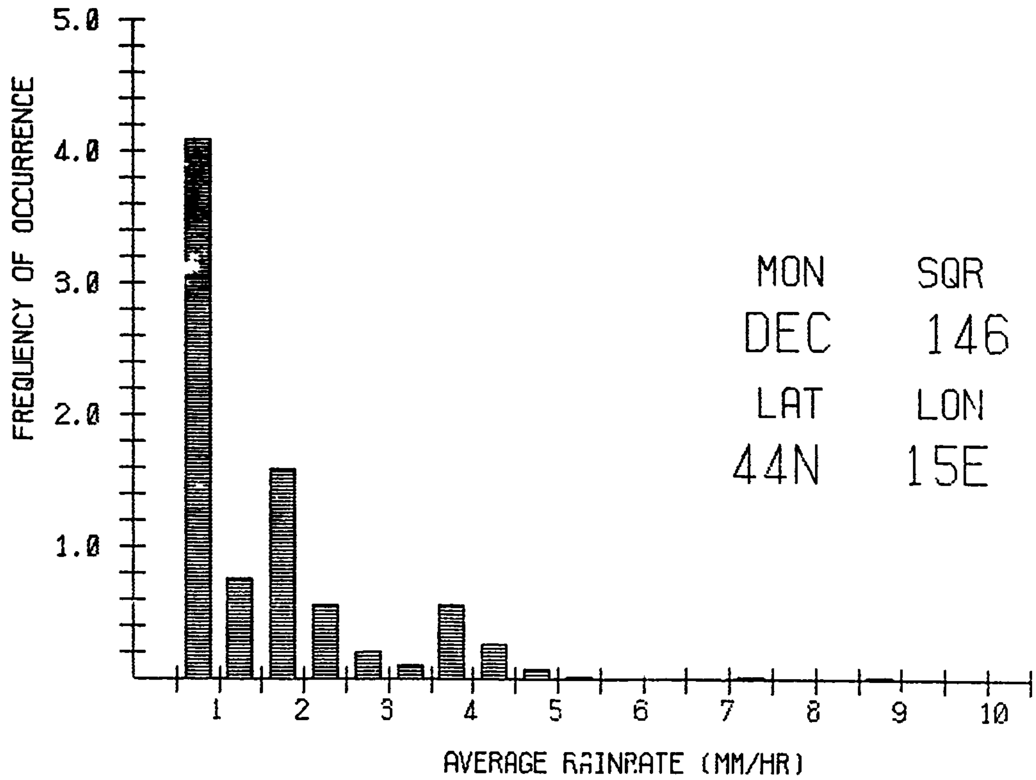
AVERAGE RAINRATE (MM/HR)



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AVERAGE RAINRATE (MM/HR)
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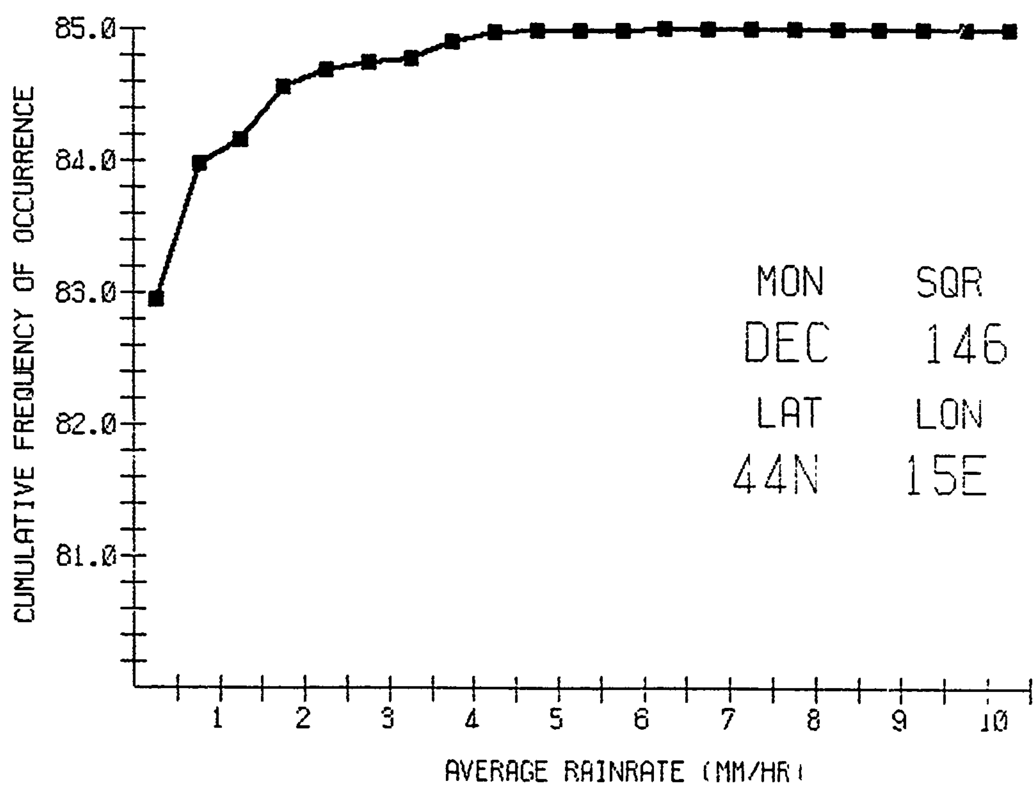
DEC 146
LAT LON
44N 15E



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AVERAGE RAINRATE (MM/HR)
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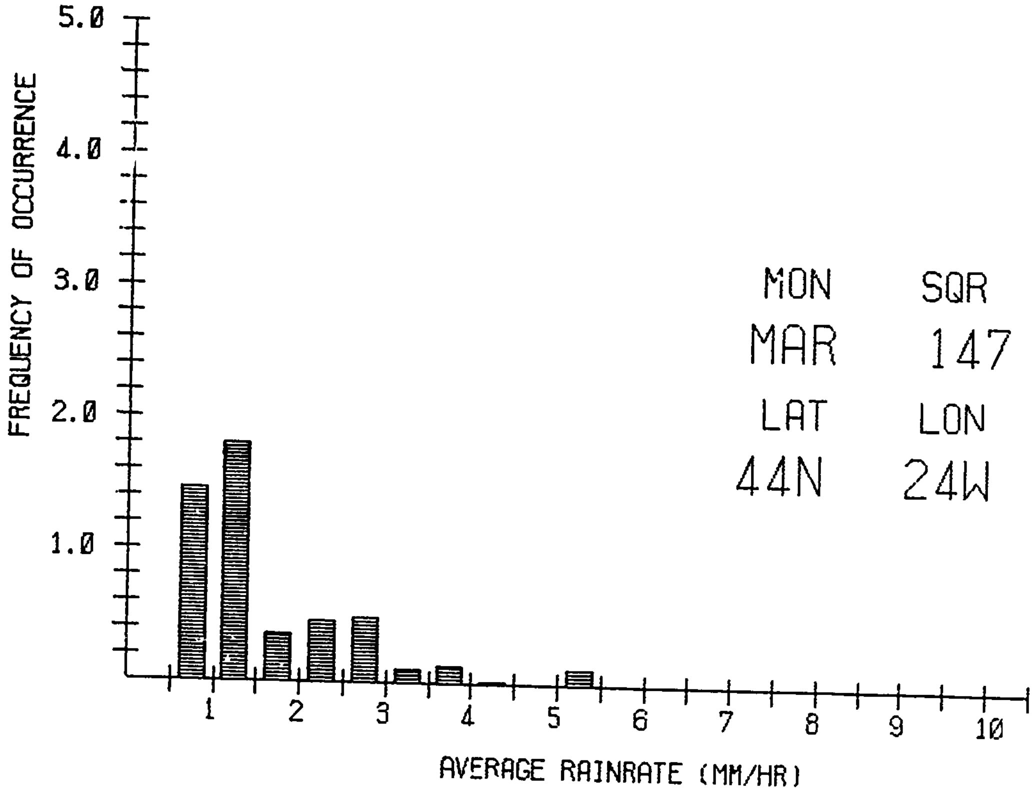
44N 15E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AVERAGE RAINRATE (MM/HR)
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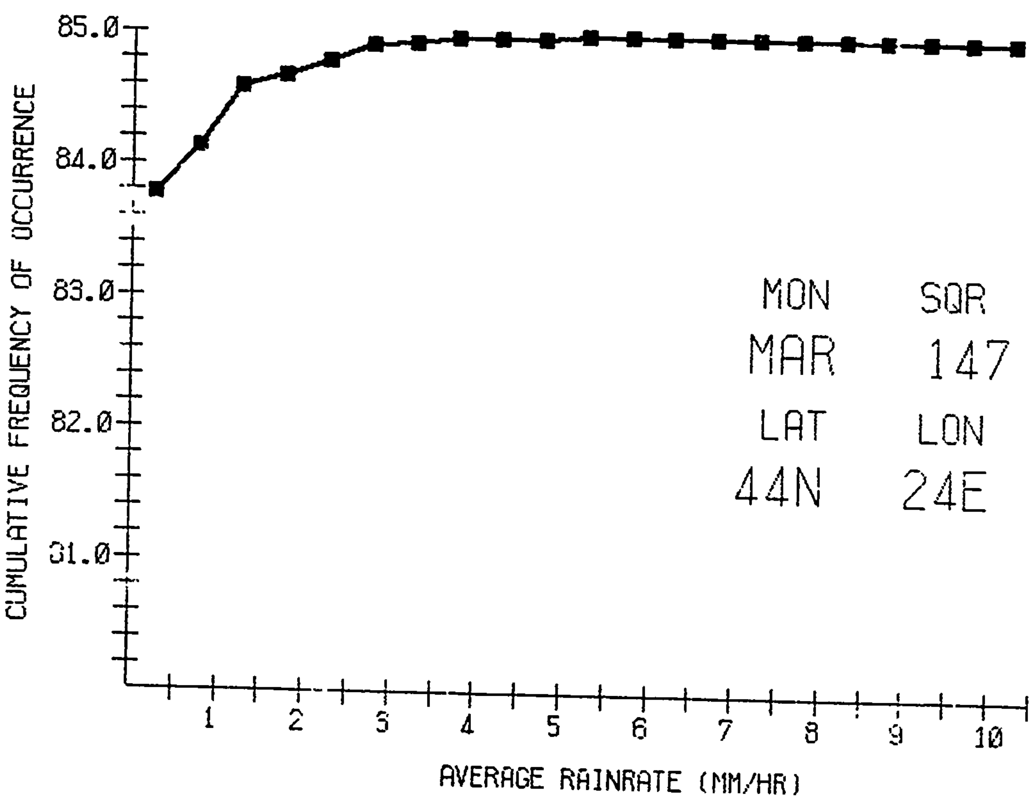
MAR 147
LAT LON
44N 24W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AVERAGE RAINRATE (MM/HR)
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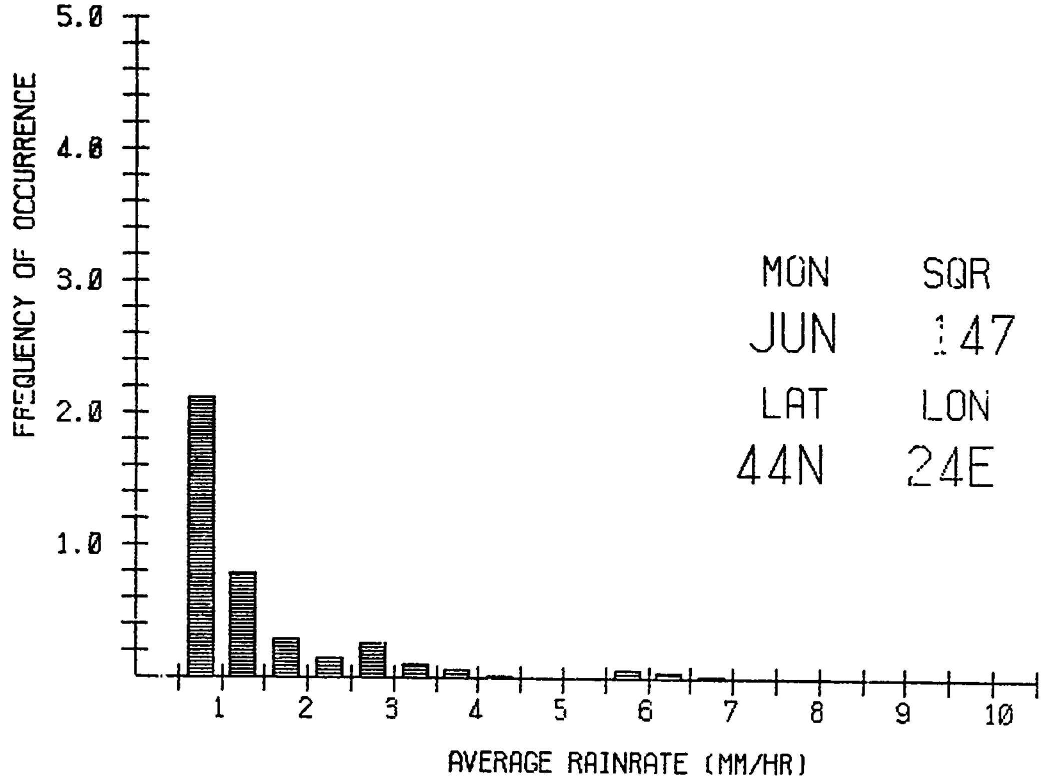
44N 24E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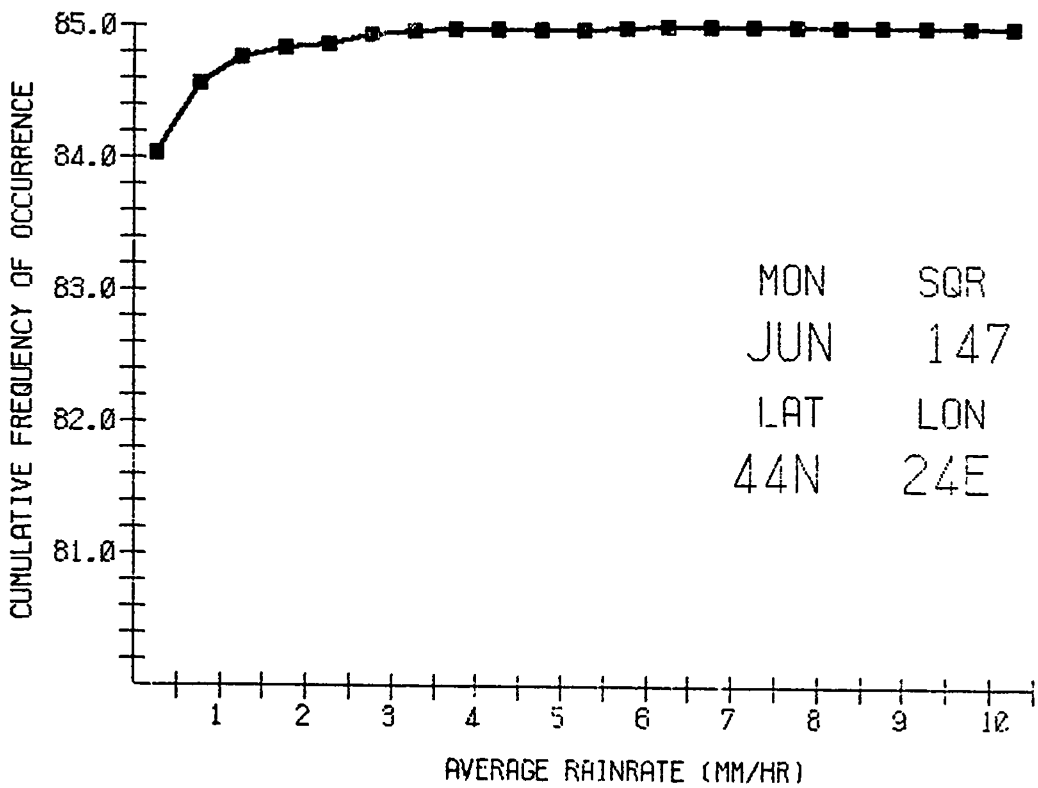
AVERAGE RAINRATE (MM/HR)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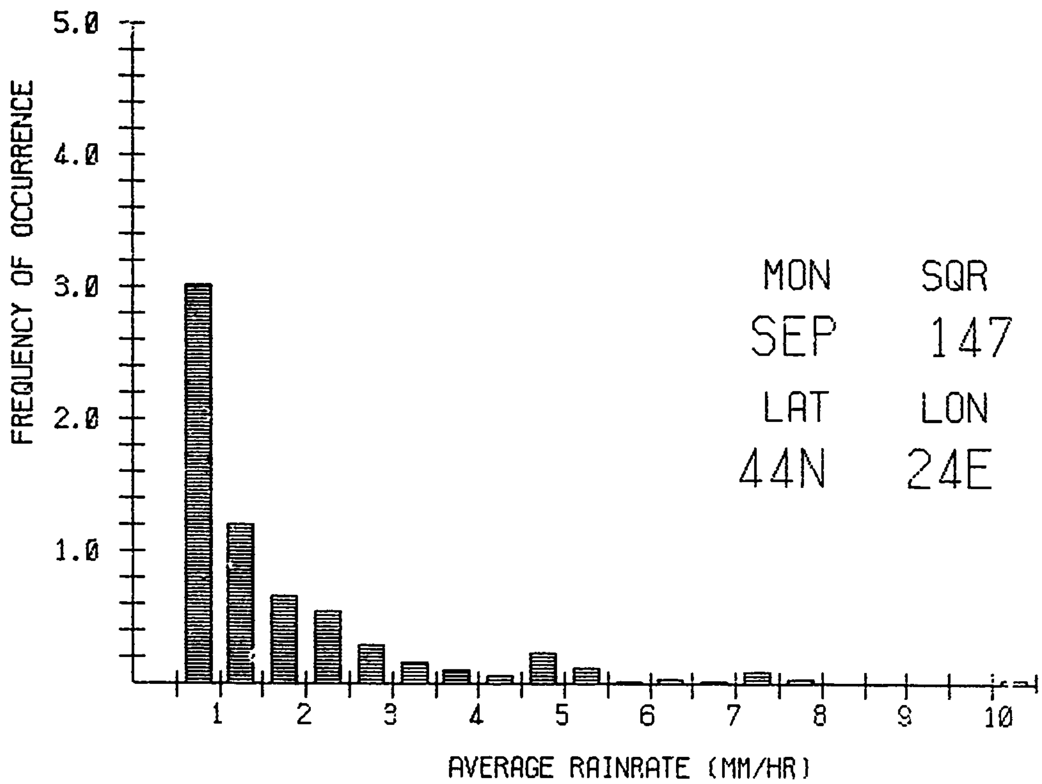
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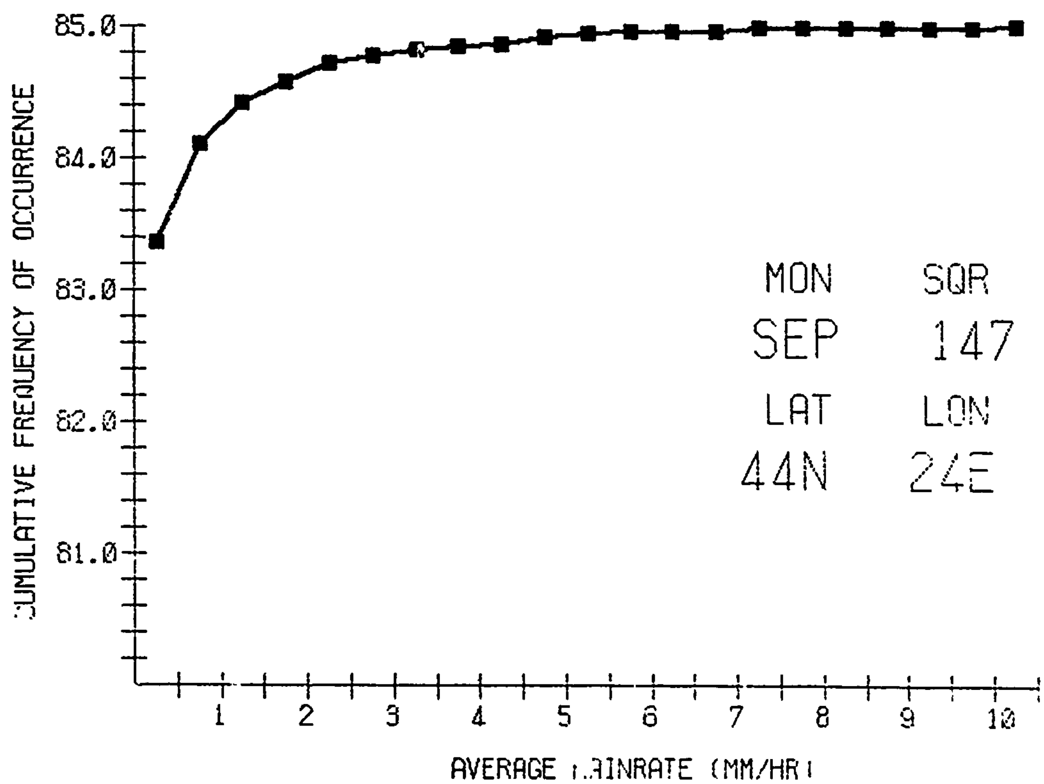
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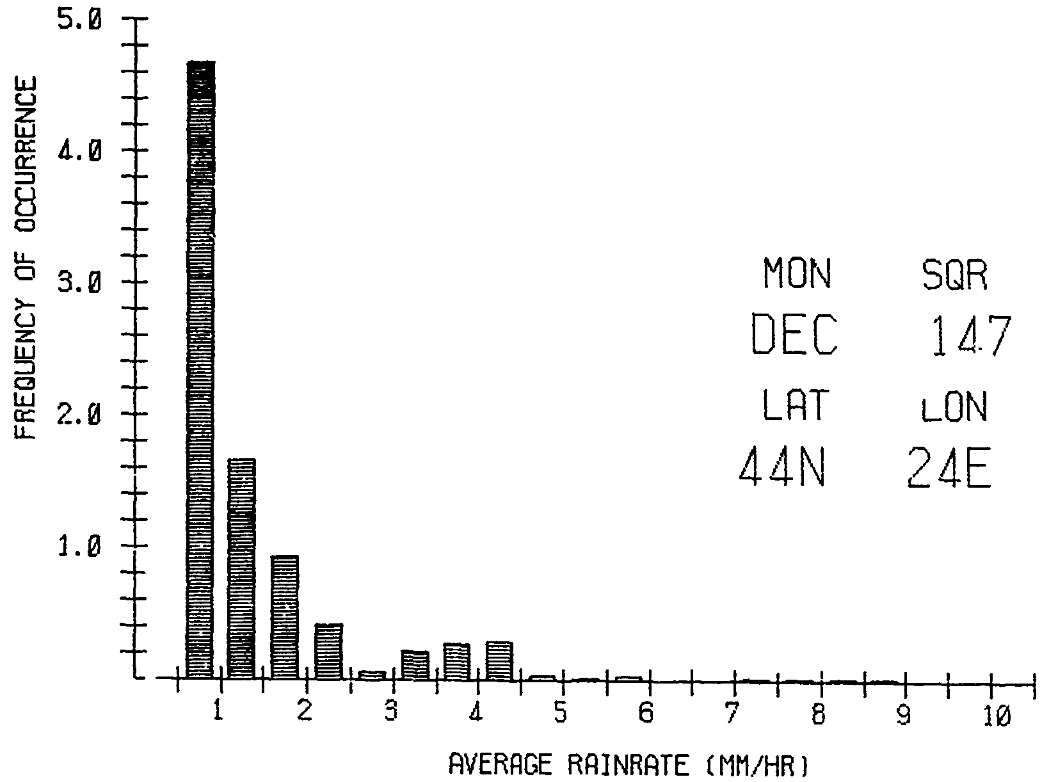
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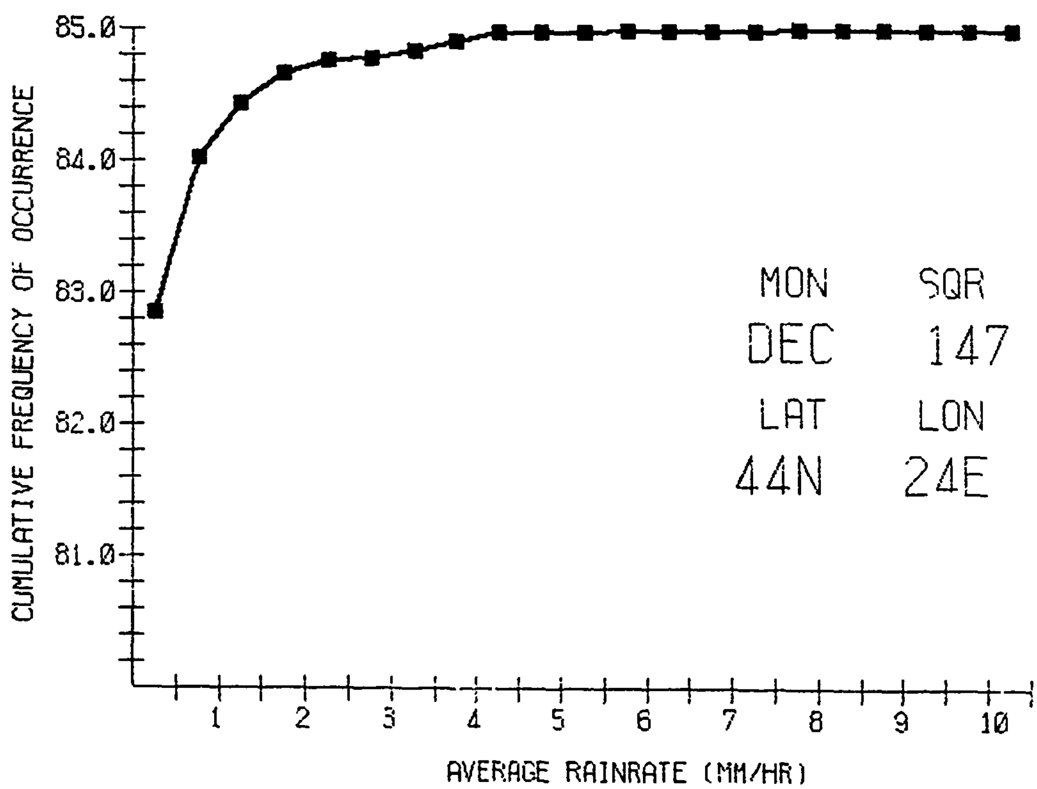
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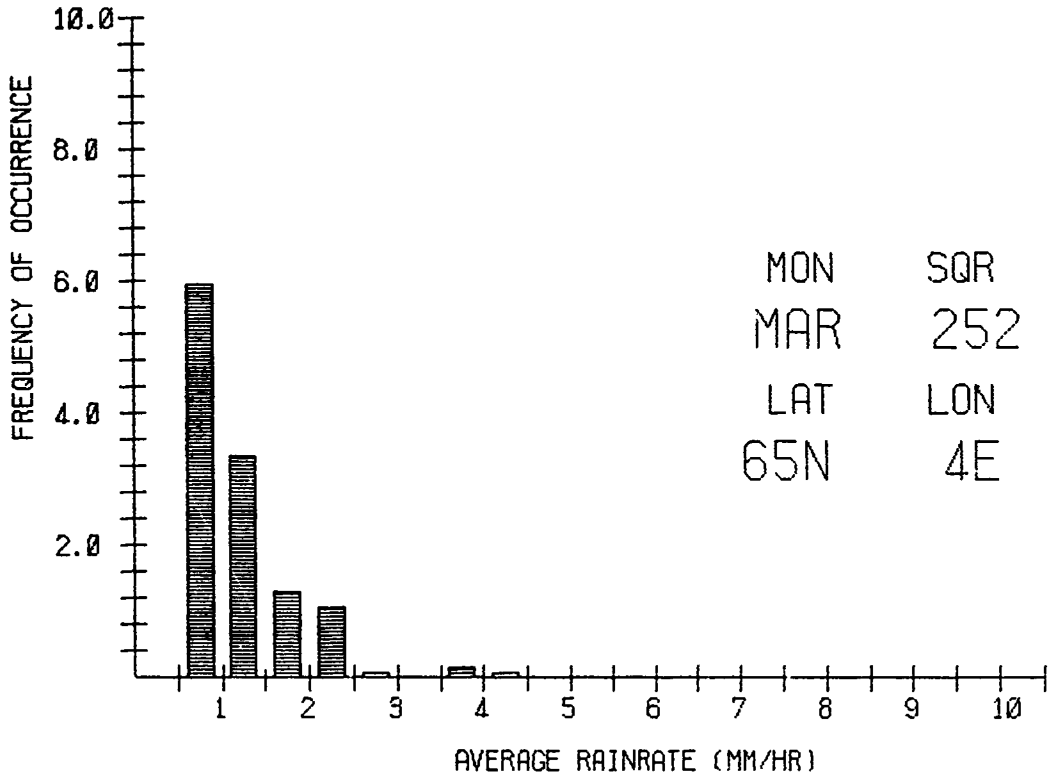
AVERAGE RAINRATE (MM/HR)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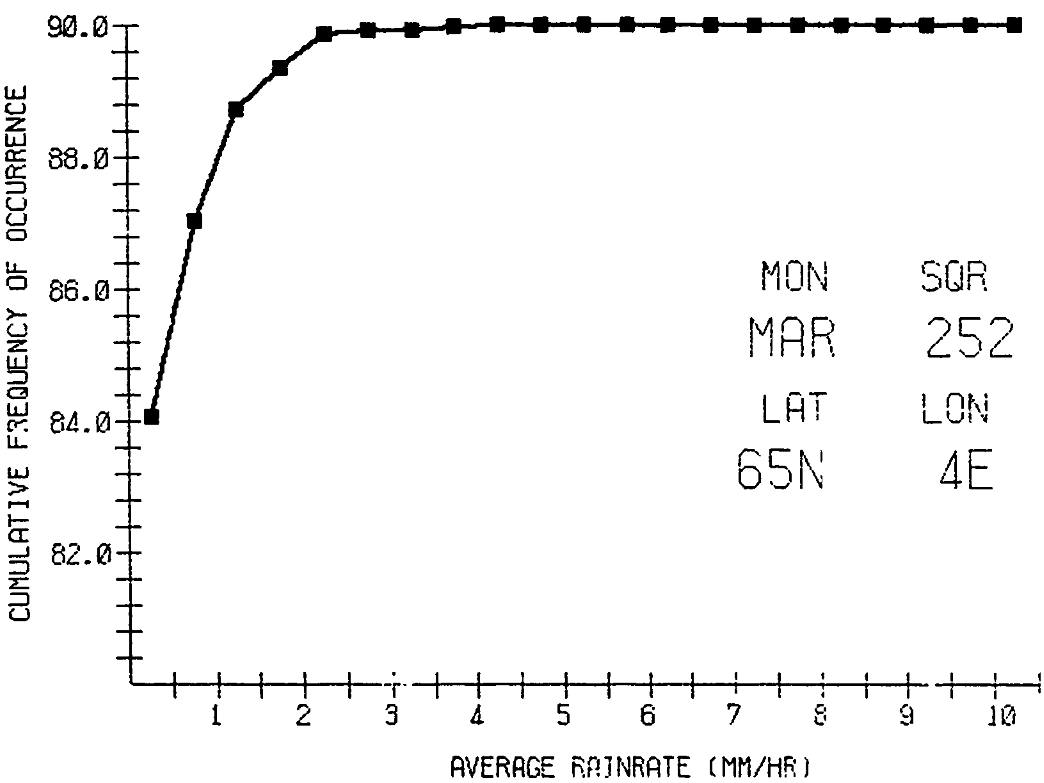
AVERAGE RAINRATE (MM/HR)
MON SQR
MAR 252
LAT LON
65N 4E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AVERAGE RAINRATE (MM/HR)
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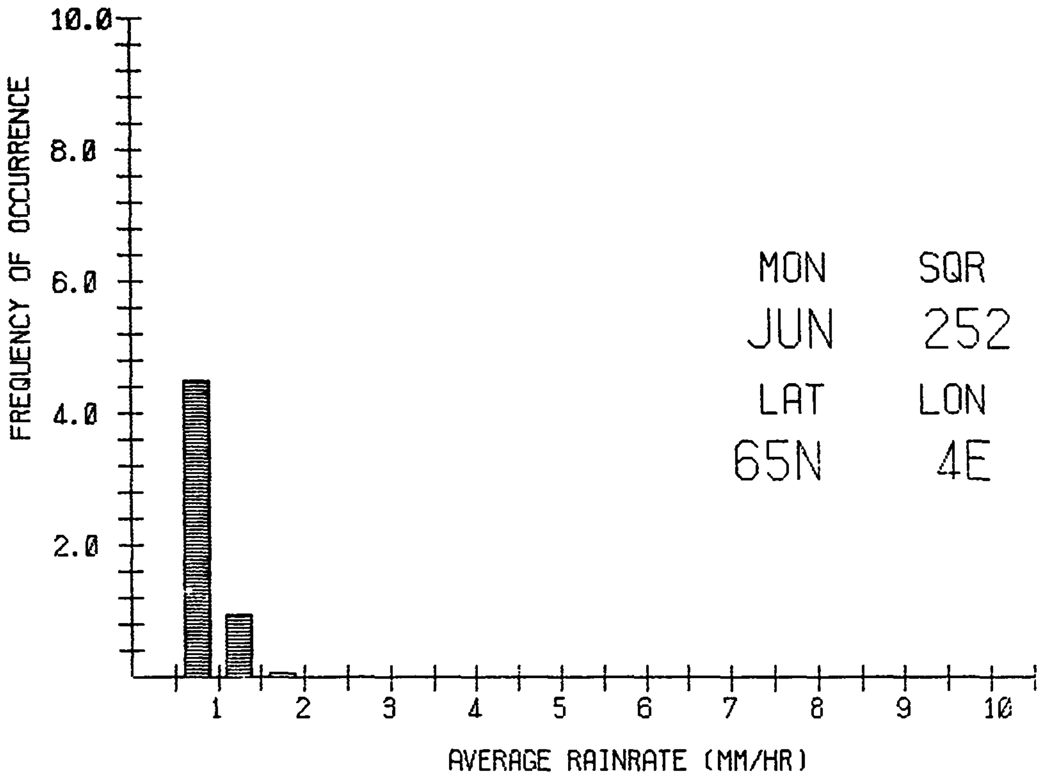
65N 4E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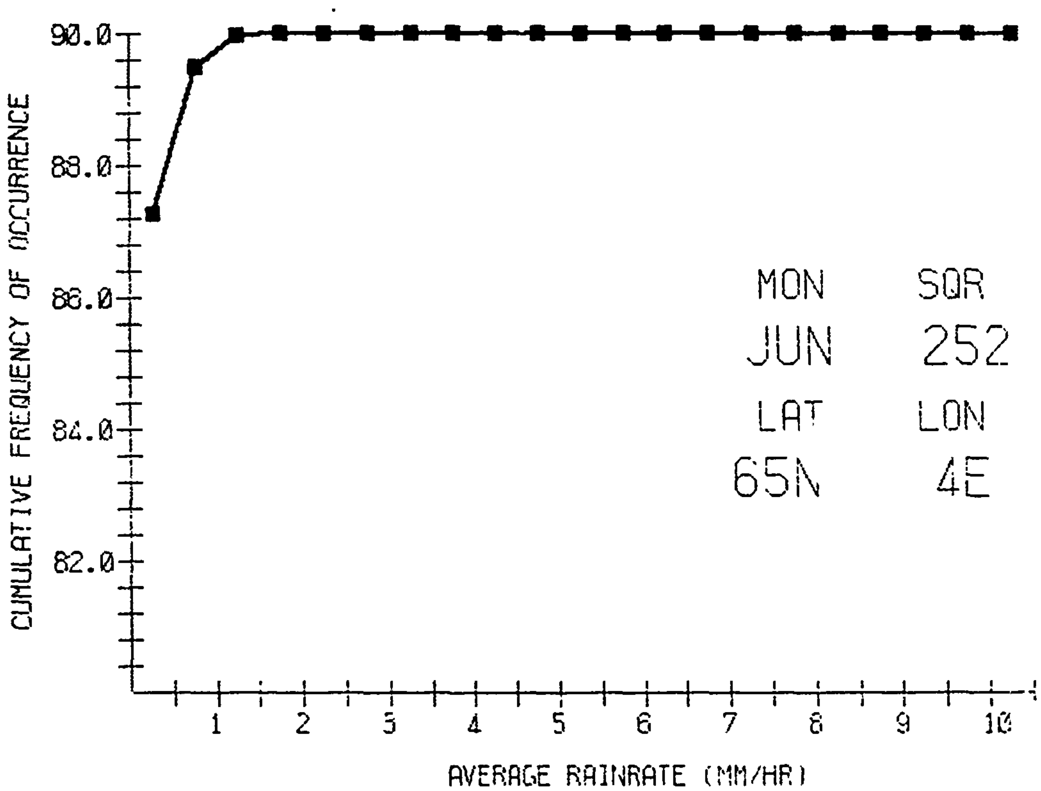
AVERAGE RAINRATE (MM/HR)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CUMULATIVE FREQUENCY OF OCCURRENCE
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JUN 252
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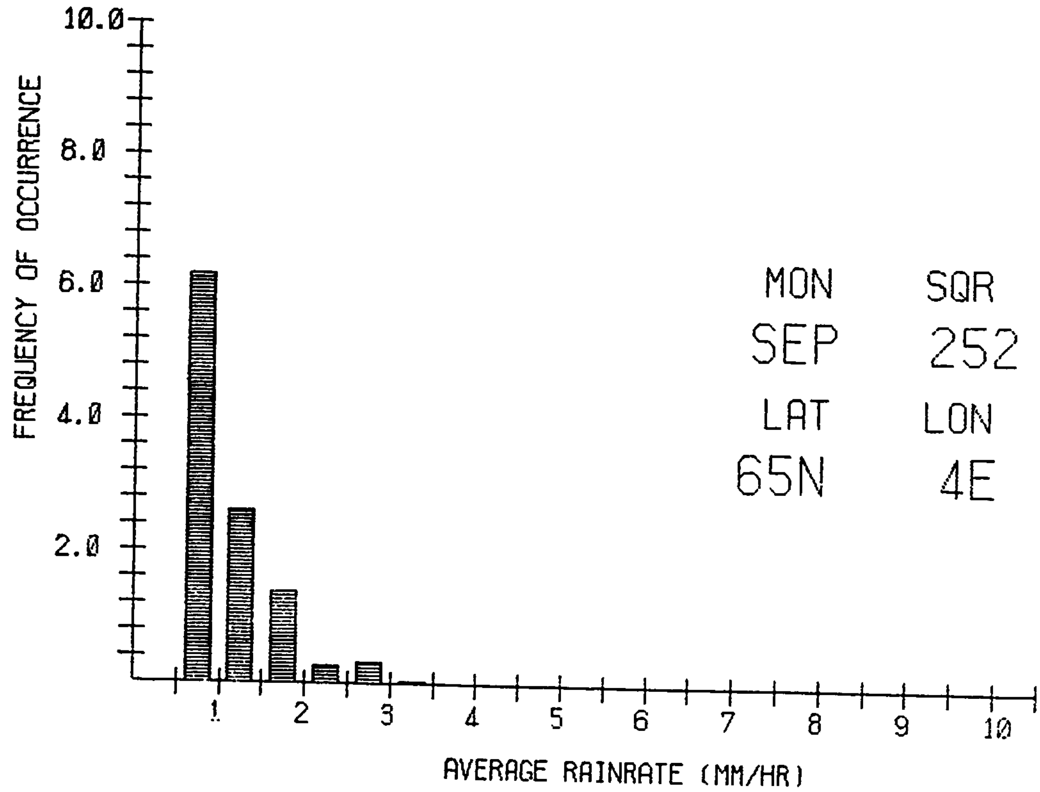
AVERAGE RAINRATE (MM/HR)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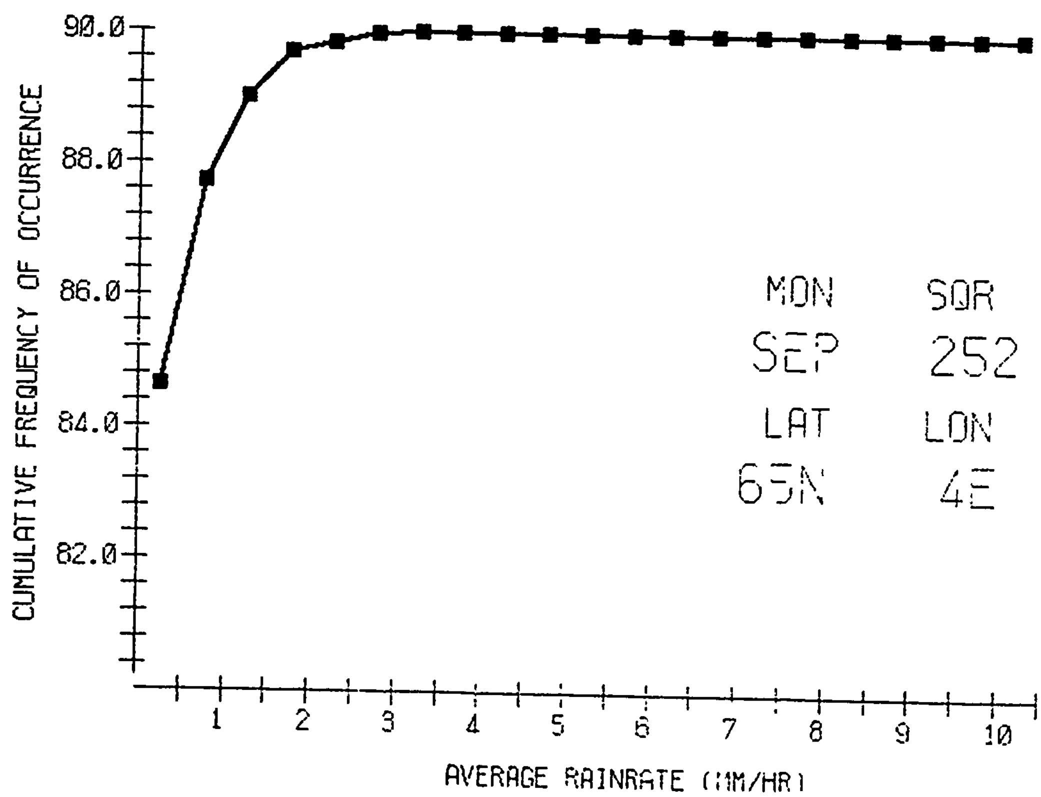
AVERAGE RAINRATE (MM/HR)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CUMULATIVE FREQUENCY OF OCCURRENCE
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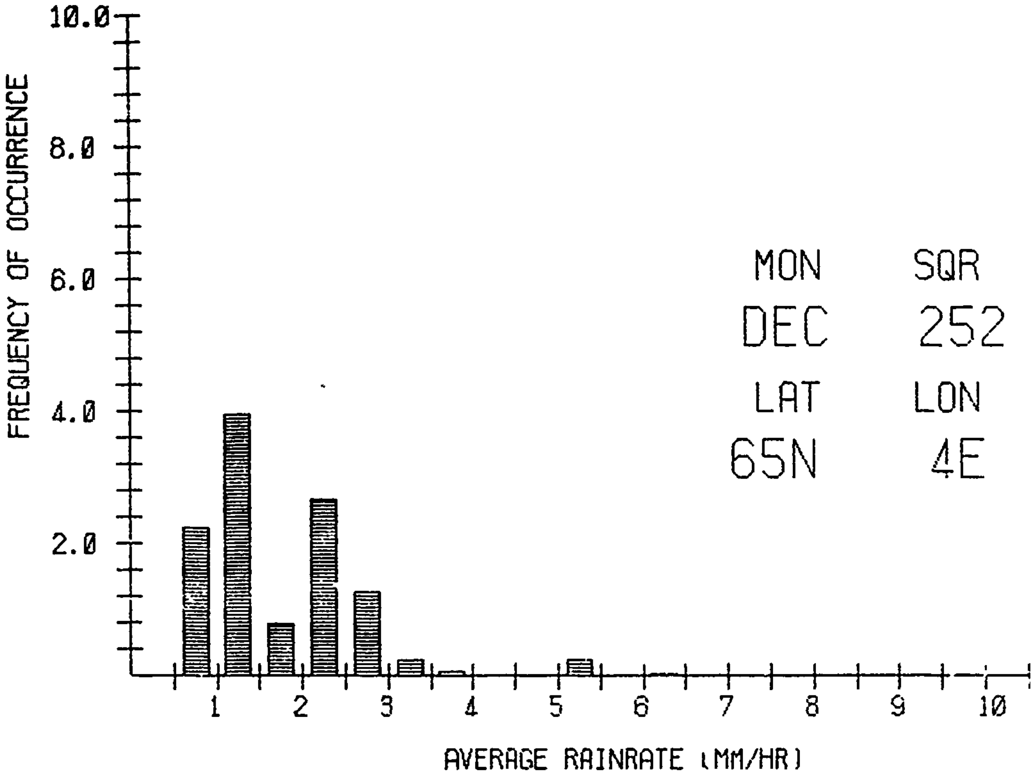
AVERAGE RAINRATE (MM/HR)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FREQUENCY OF OCCURRENCE
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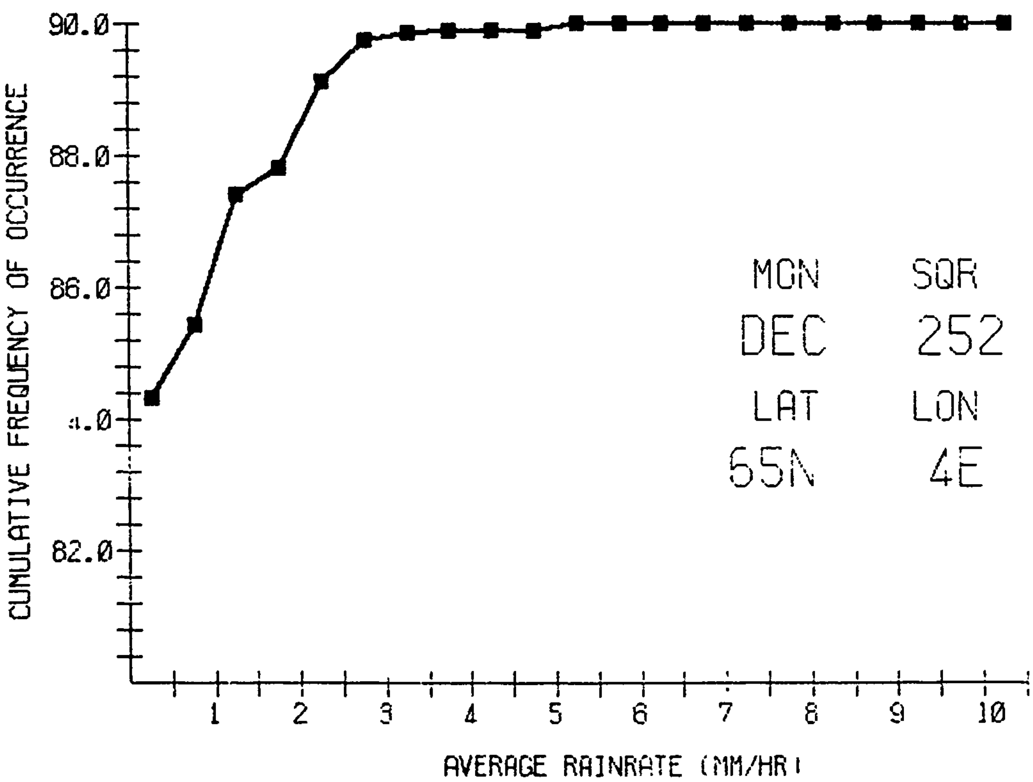
AVERAGE RAINRATE (MM/HR)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CUMULATIVE FREQUENCY OF OCCURRENCE
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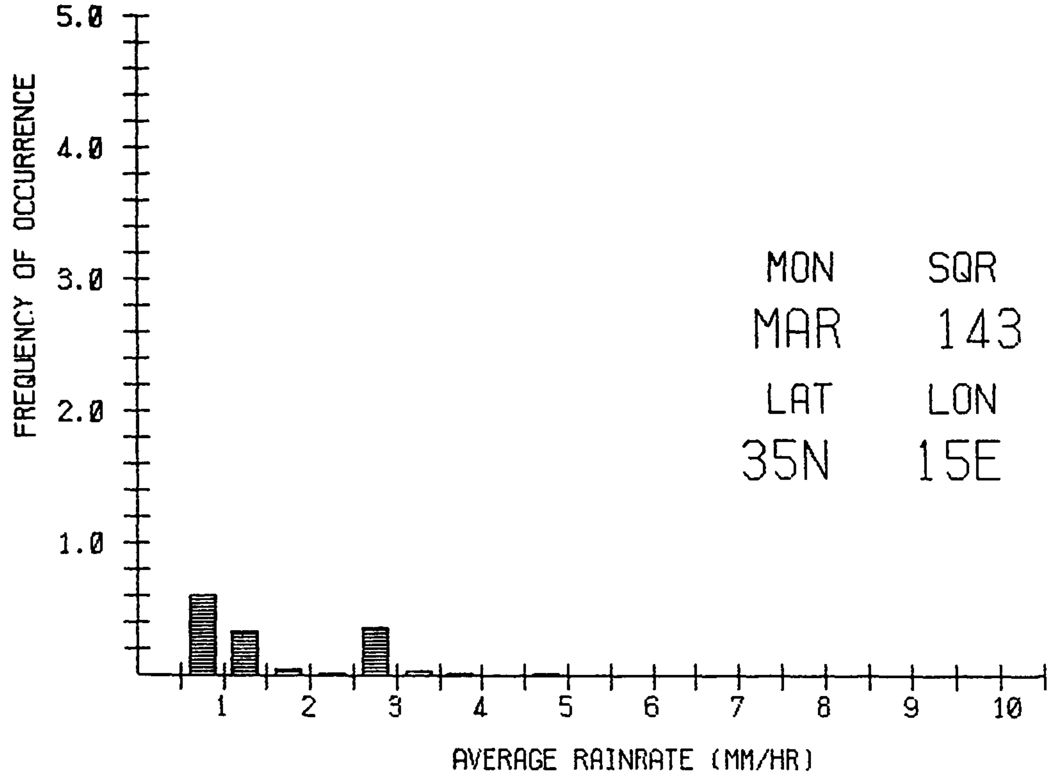
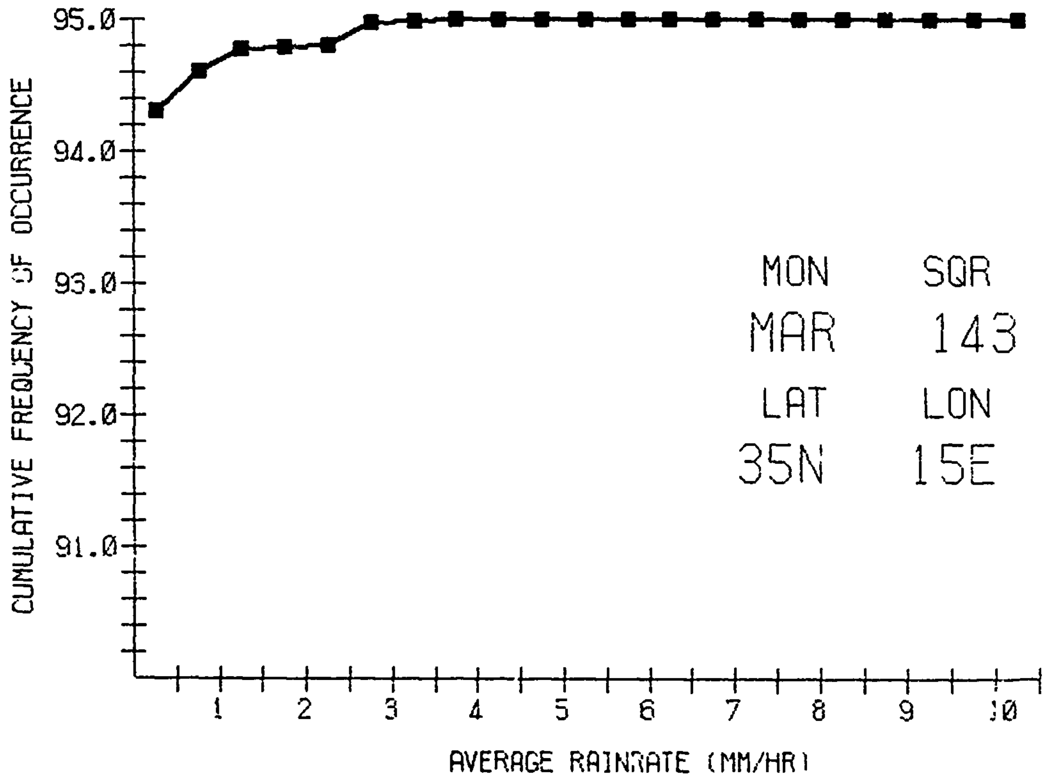
65N 4E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)



5.0
4.0
3.0
2.0
1.0
FREQUENCY OF OCCURRENCE
MON SQR
MAR 143
LAT LON
35N 15E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)



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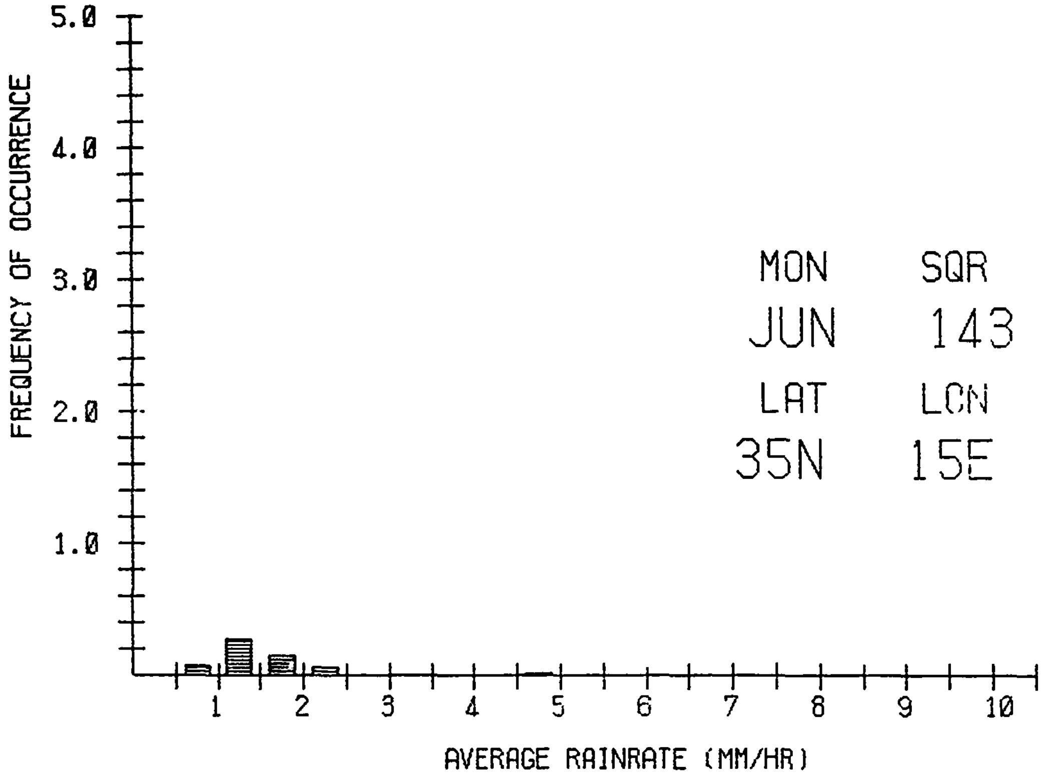
92.0
91.0
CUMULATIVE FREQUENCY OF OCCURRENCE
MON SQR
MAR 143
LAT LON
35N 15E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)



5.0
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1.0
FREQUENCY OF OCCURRENCE
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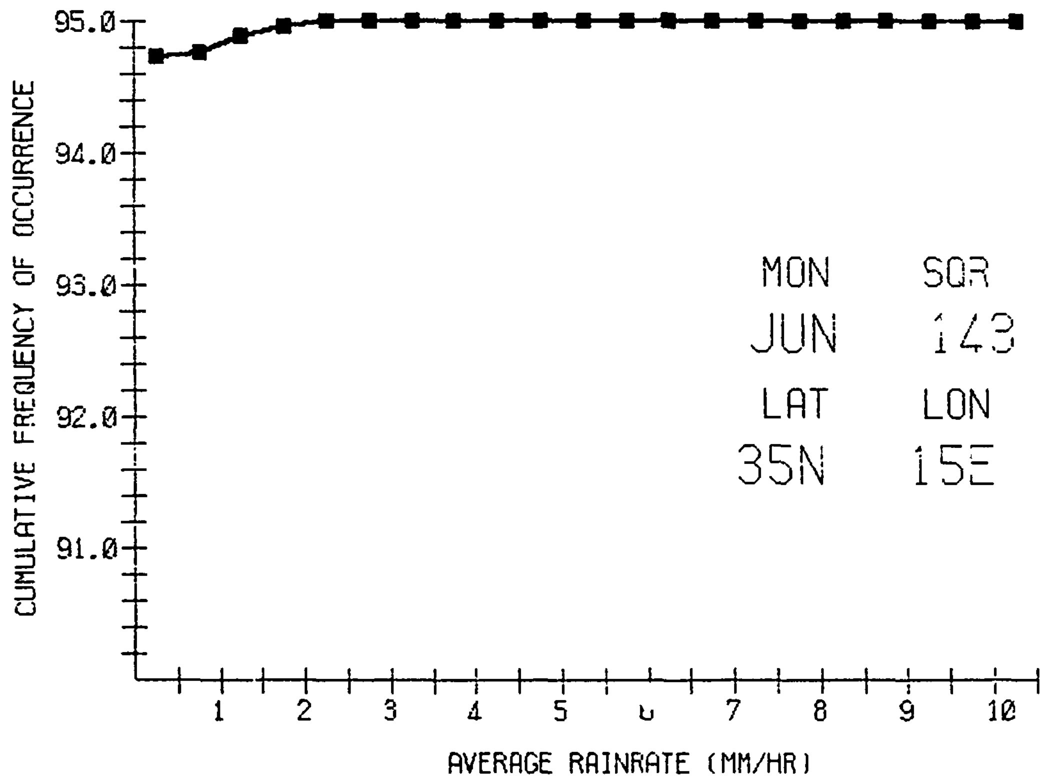
AVERAGE RAINRATE (MM/HR)
MON
SQR
JUN
143
LAT
LON
35N
15E



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CUMULATIVE FREQUENCY OF OCCURRENCE
1
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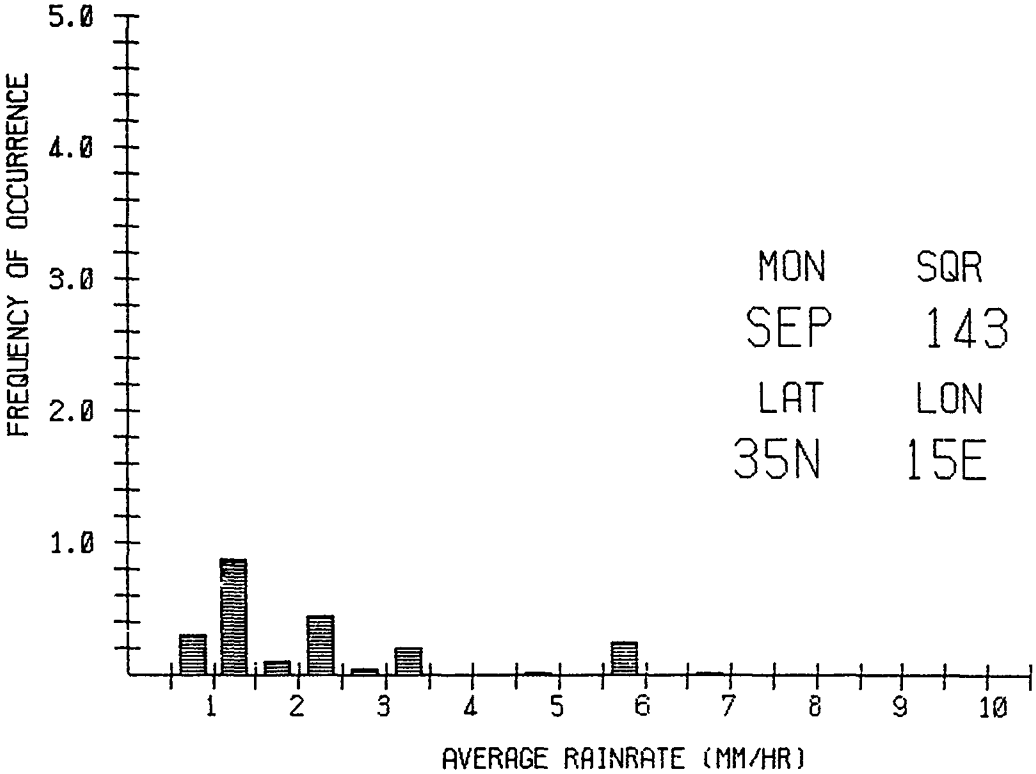
AVERAGE RAINRATE (MM/HR)
MON
SQR
JUN
143
LAT
LON
35N
15E



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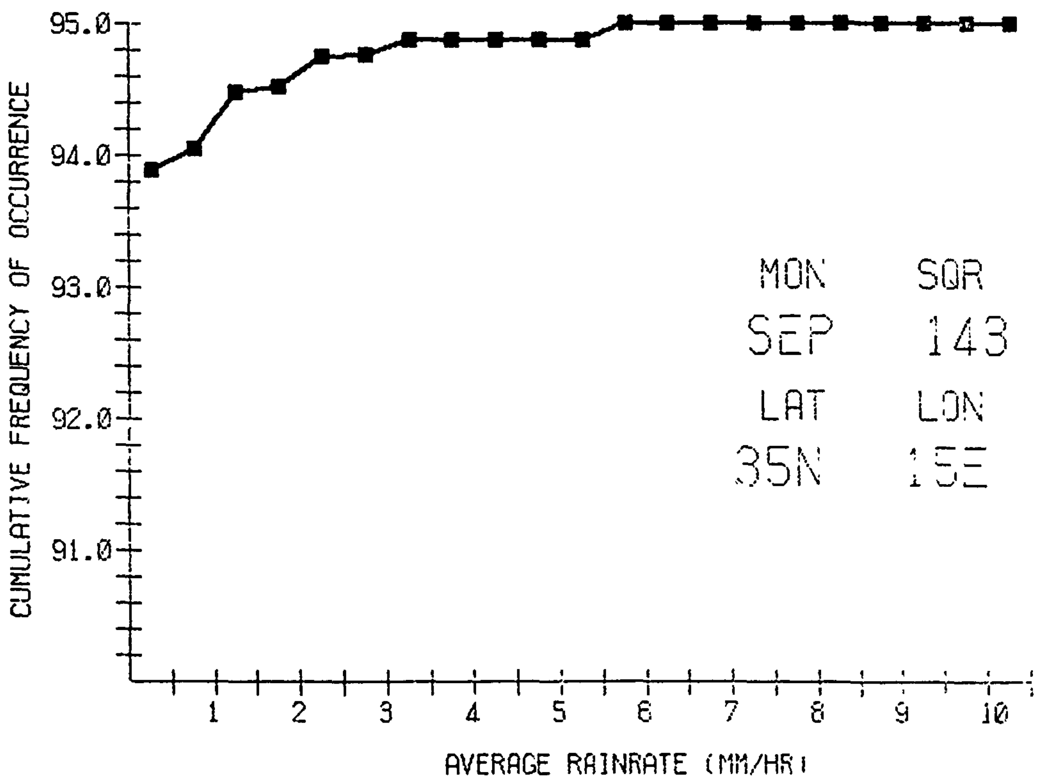
3.0
2.0
1.0
FREQUENCY OF OCCURRENCE
MON SQR
SEP 143
LAT LON
35N 15E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)



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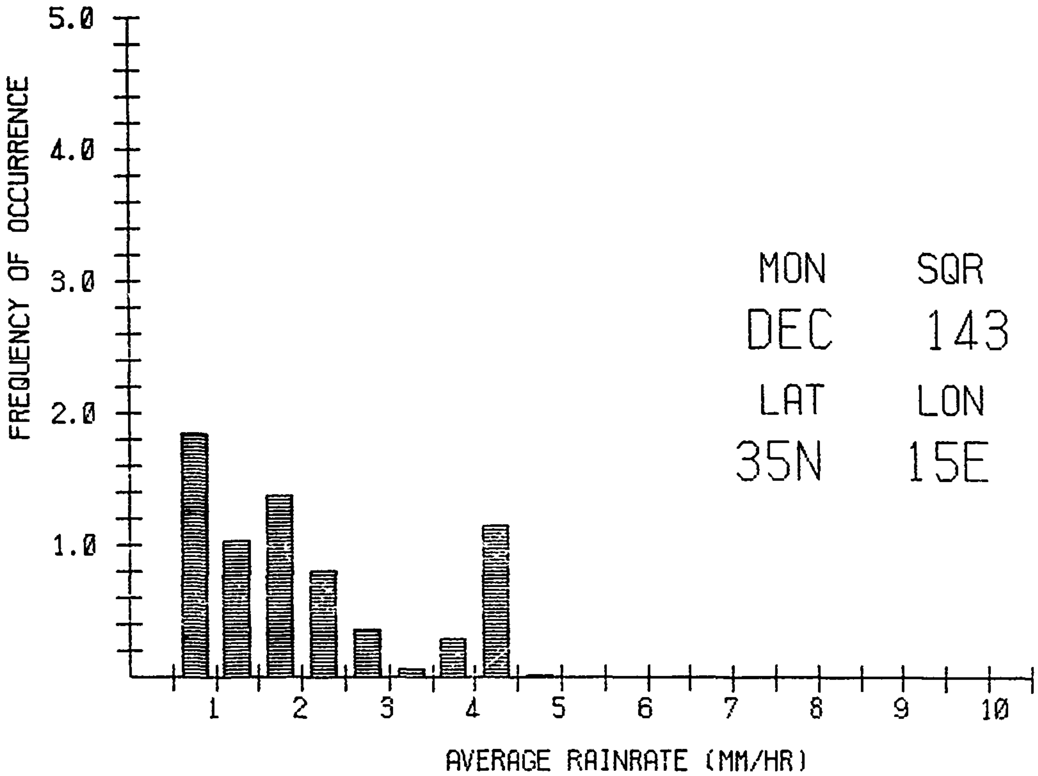
92.0
91.0
CUMULATIVE FREQUENCY OF OCCURRENCE
MON SQR
SEP 143
LAT LON
35N 15E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)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4.0
3.0
2.0
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FREQUENCY OF OCCURRENCE
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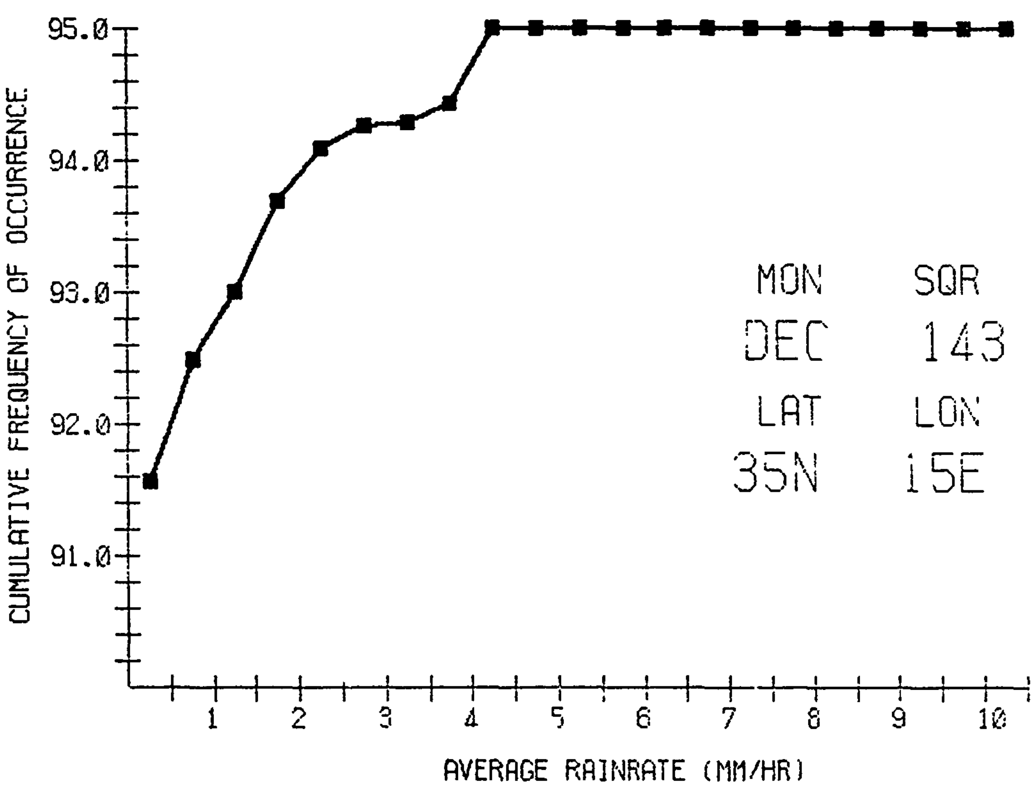
AVERAGE RAINRATE (MM/HR)
MON SQR
DEC 143
LAT LON
35N 15E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93.0
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CUMULATIVE FREQUENCY OF OCCURRENCE
1
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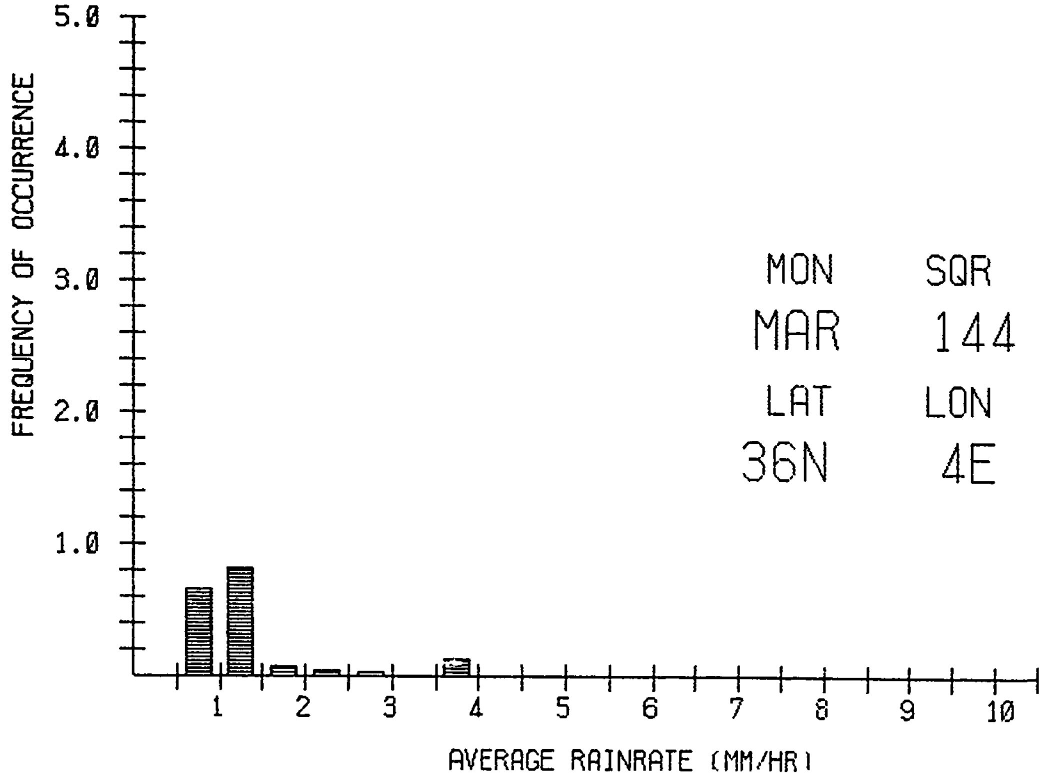
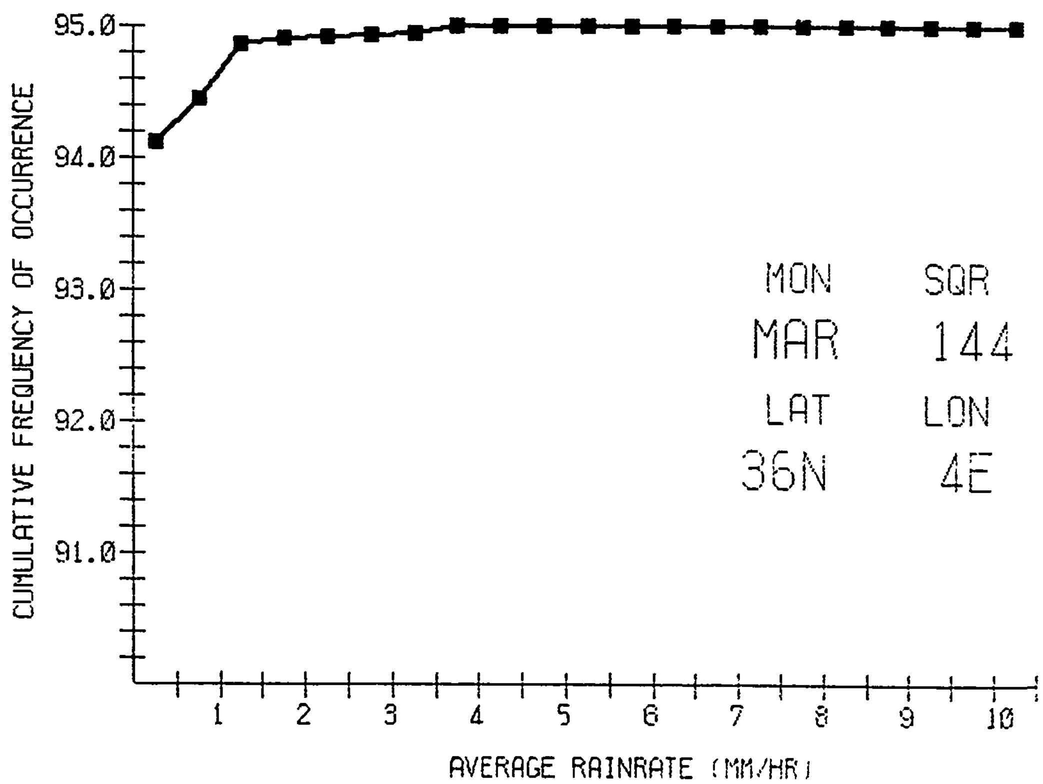
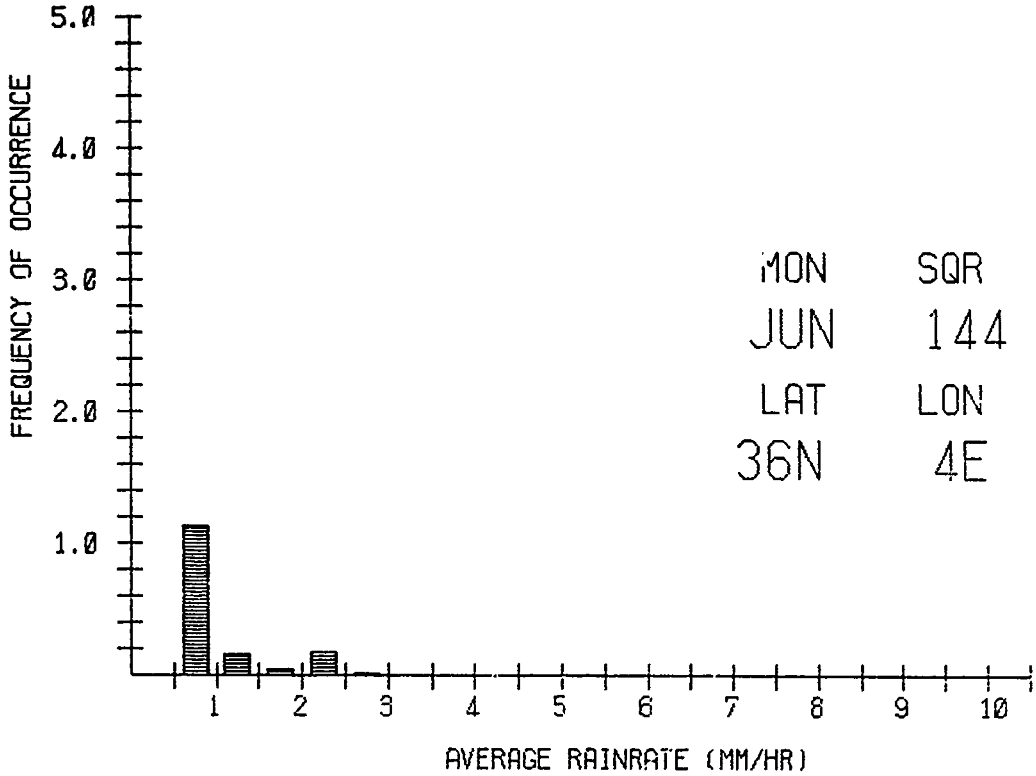
AVERAGE RAINRATE (MM/HR)
MON SQR
DEC 143
LAT LON
35N 15E



5.0
4.0
3.0
2.0
1.0
FREQUENCY OF OCCURRENCE
MON SQR
MAR 144
LAT LON
36N 4E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)



95.0
94.0
93.0
92.0
91.0
CUMULATIVE FREQUENCY OF OCCURRENCE
MON SQR
MAR 144
LAT LON
36N 4E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)



FREQUENCY OF OCCURRENCE
5.0
4.0
3.0
2.0
1.0
1
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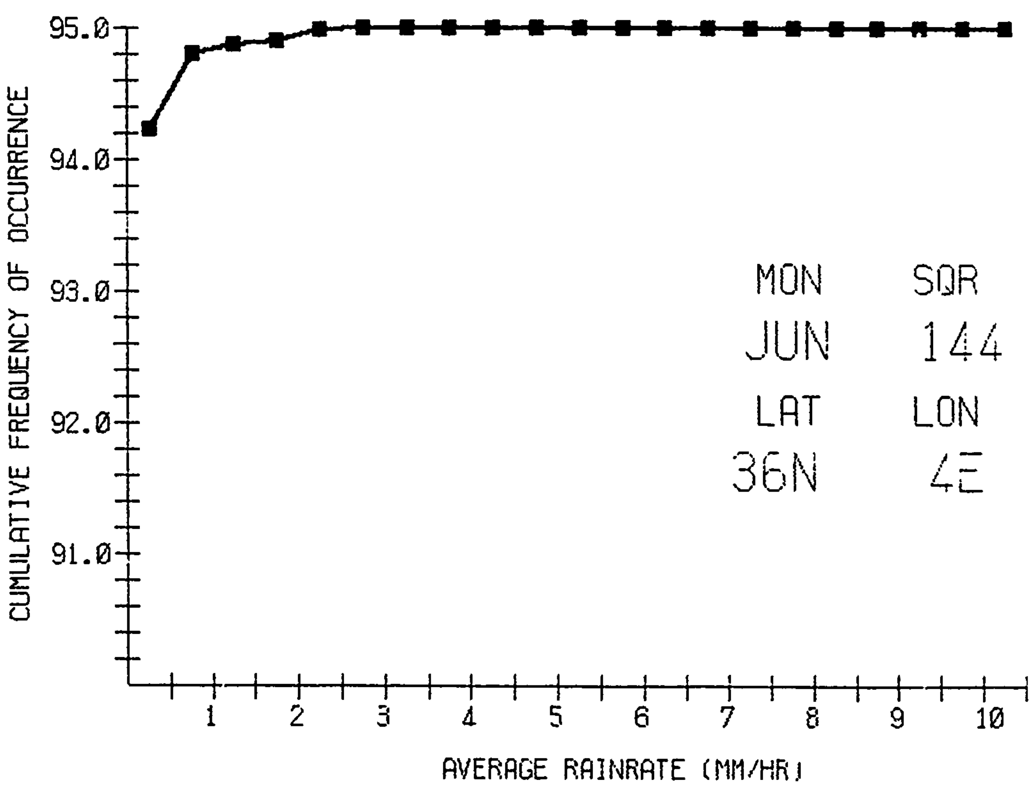
AVERAGE RAINRATE (MM/HR)
MON SQR
JUN 144
LAT LON
36N 4E



CUMULATIVE FREQUENCY OF OCCURRENCE
95.0
94.0
93.0
92.0
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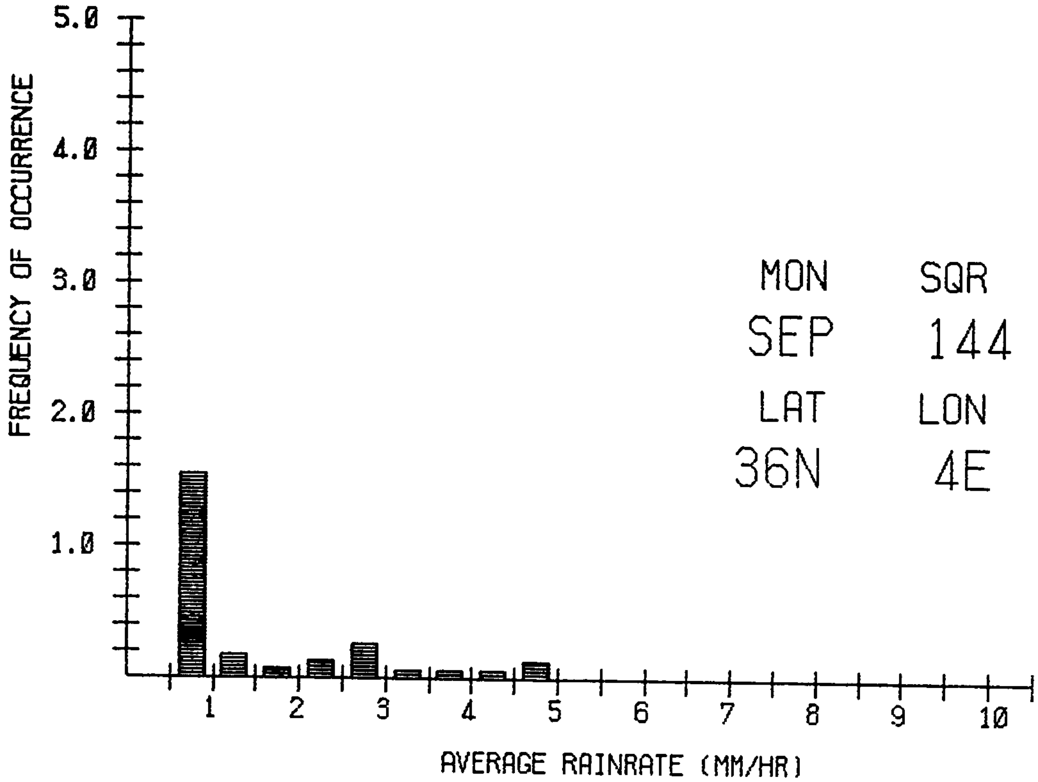
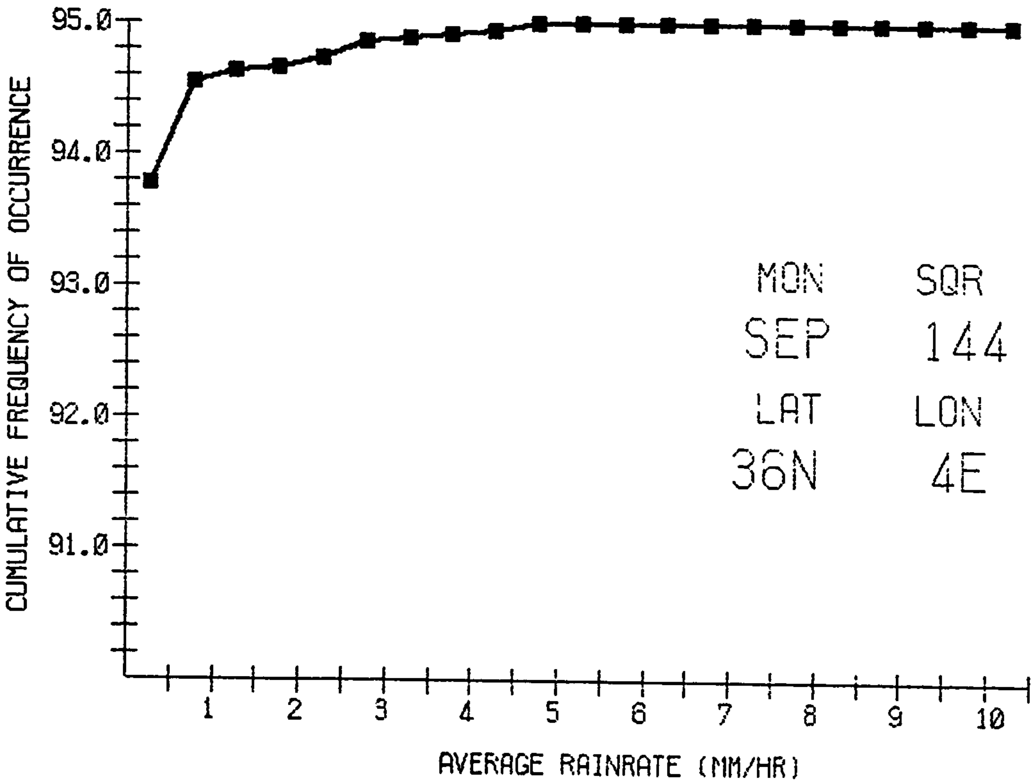
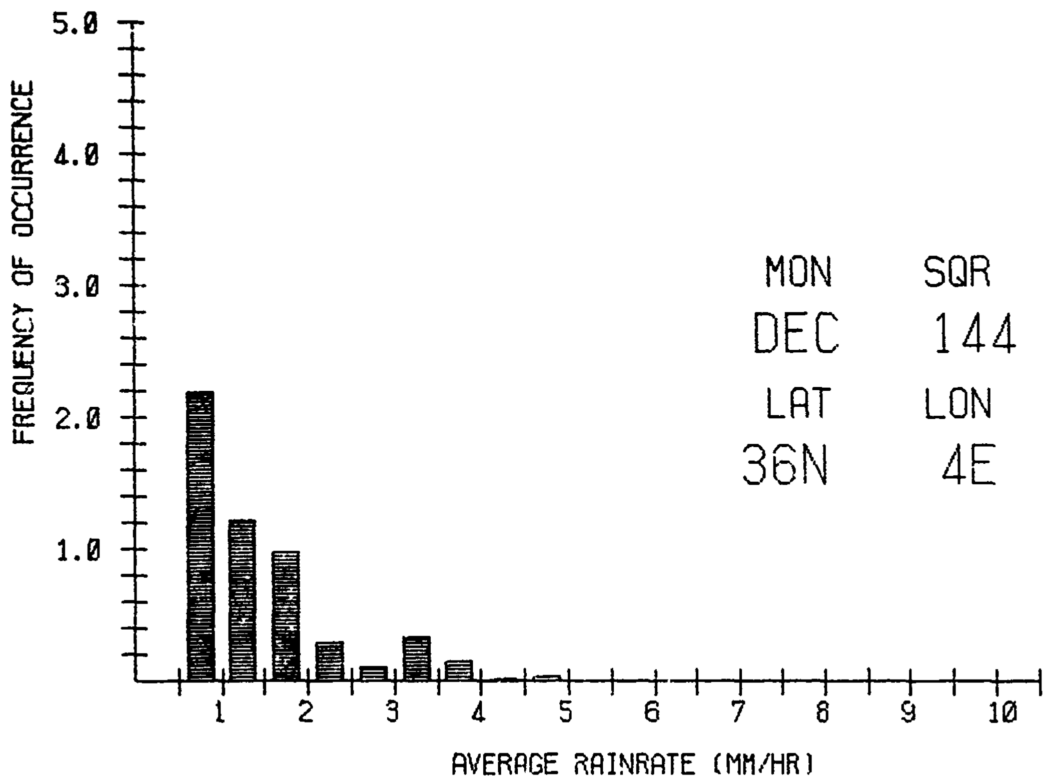
AVERAGE RAINRATE (MM/HR)
MON SQR
JUN 144
LAT LON
36N 4E



5.0
4.0
3.0
2.0
1.0
FREQUENCY OF OCCURRENCE
MON SQR
SEP 144
LAT LON
36N 4E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)



95.0
94.0
93.0
92.0
91.0
CUMULATIVE FREQUENCY OF OCCURRENCE
MON SQR
SEP 144
LAT LON
36N 4E
1 2 3 4 5 6 7 8 9 10
AVERAGE RAINRATE (MM/HR)


5.0
4.0
3.0
2.0
1.0
FREQUENCY OF OCCURRENCE
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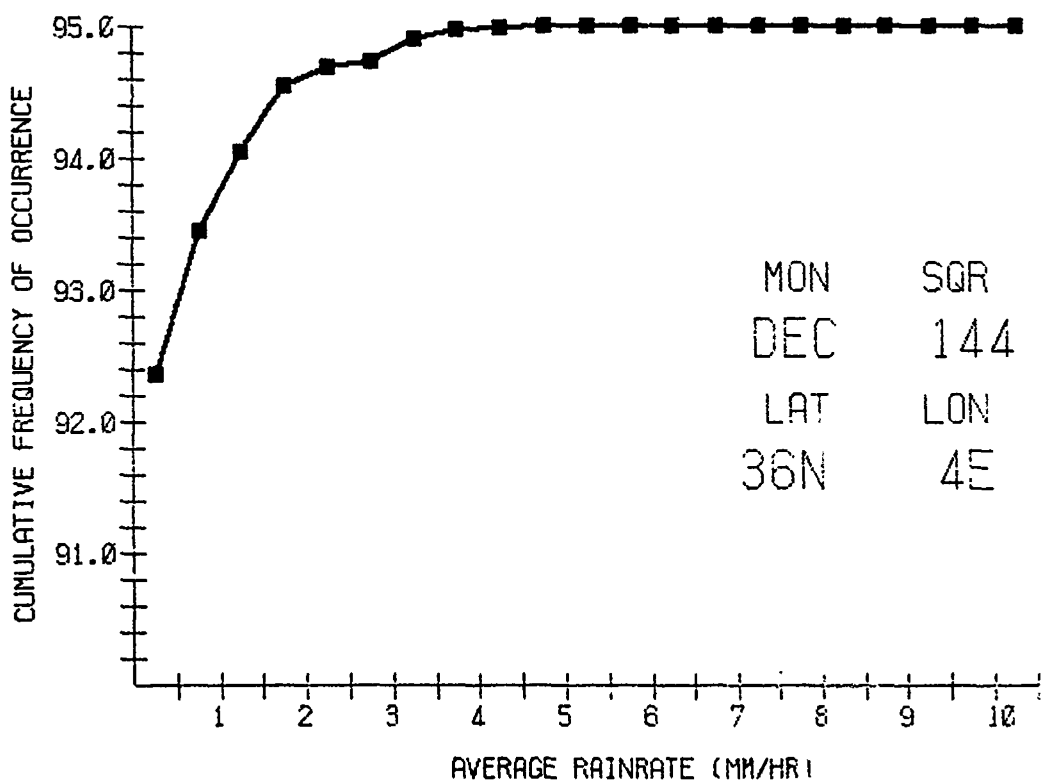
AVERAGE RAINRATE (MM/HR)
MON SQR
DEC 144
LAT LON
36N 4E


95.0
94.0
93.0
92.0
91.0
CUMULATIVE FREQUENCY OF OCCURRENCE
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AVERAGE RAINRATE (MM/HR)
MON SQR
DEC 144
LAT LON
36N 4E

APPENDIX B

MARPLT PROGRAM LISTINGS

This appendix contains program listings of programs relating archived meteorological data to rain rates and extinction coefficients.

```
      PROGRAM MARPLT(INPUT,OUTPUT,TAPE1,TAPE2=OUTPUT,TAPE3)
C          THIS ROUTINE READS CDS TOF11 TAPES, CALCULATES
C            MONTHLY WX STATS FOR MARSDEN SQUARES, AND PLOTS
C            RAINRATE FREQUENCIES FOR FOUR MONTHS
      COMMON/BLIND/MASKR(45),LSHFT(45)
      COMMON/AVG/FVIS1(12),FRAIN1(12),FDET1(12),FMIR1(12),
     *NVIS,NRAIN,NDET,NMIR,NRNRT(21,12),
     *NMN(12),NDMN,SUMLAT,SUMLON,SQLAT,SQLON,
     *NREC,NDATA,ILAT,JLAT,ILON,JLON,MONTH(12),
     *FRNRT1(21,12),FRNRT2(21,12),NMARSS(12),NMSUB,
     *SUMLAT2,SUMLON2,SQLAT2,SQLON2,NDATTO,
     *FVIS3(12),FDET3(12),FMIR3(12),FRAIN3(12),
     *RMEAN(3,100,12),STDEV(3,100,12),MOBS(3,100,12),
     *SUMDUM(3),SQDUM(3)
      DIMENSION AWORD(45),INTER(45),INBUF(500)
      DIMENSION FRNRT3(21,12)
      DIMENSION IWATSUB(100)
      LOGICAL LCHK(45),LTEST,FIRST
      EQUIVALENCE (IPH,INTER(28)),(IVIS,INTER(29)),(IERR,INTER(30)),
     *(OSV,INTER(31)),(IMN,INTER(41)),(IDY,INTER(42)),(IHR,INTER(43))
      DATA AWORD/9*0.0,10*1.0,14*2.0,10*3.0,4.0,4.0/
      DATA LCHK/(.T.),2*(.F.),3*(.T.),5*(.F.),7*(.T.),2*(.F.),
     *7*(.T.),2*(.F.),9*(.T.),7*(.F.)/
      DATA FVIS1/12*0.0/
      DATA FRAIN1/12*0.0/
      DATA FDET1/12*0.0/
      DATA FMIR1/12*0.0/
      DATA NMN/12*0/
      DATA NRNRT/252*0/
      DATA FRNRT1/252*0.0/
      DATA FRNRT2/252*0.0/
      DATA NMARSS/12*0/
      DATA MONTH/≠JAN≠,≠FEB≠,≠MAR≠,≠APR≠,≠MAY≠,≠JUN≠,≠JUL≠,
     *≠AUG≠,≠SEP≠,≠OCT≠,≠NOV≠,≠DEC≠/
      NFILES=1
      NDATA=0
      NRAIN=0
      NVIS=0
      NDET=0
      NMIR=0
      NREC=0
C
C          PRESET PARAMETERS FOR MONTHLY AND MARSDEN SQ AVERAGES
C
      FIRST=.TRUE.
      NDMN=0
      FVIS2=FRAIN2=FDET2=FMIR2=0.0
C
C
   10      NREC=NREC+1
      BUFFER IN (1,1)(INBUF(1),INBUF(500))
      IF (UNIT(1))20,30,40
   20      LEN=LENGTH(1)
C          RECORD HAS BEEN READ, AND LENGTH RECORDED IN LEN
      GO TO 1000
   30 PRINT 35,NREC,NFILES
   35 FORMAT(1H0,≠EOF ENCOUNTERED AT RECORD NO.≠,I5,≠ IN FILE NO.≠,I3)
```

```
      GO TO 777
   40 PRINT*,≠ PARITY ERROR AT RECORD NO.≠,NREC,≠SKIP≠
      GO TO 10
 1000 CONTINUE
C           NUMBER OF OBSERVATIONS EQUALS (NO OF WORDS/5)
      NOBS=LEN/5
      IF(LEN.EQ.NOBS*5)GO TO 1010
C           ODD NUMBER OF RECORDS ENCOUNTERED GO TO NEXT RECORD.
      PRINT*,≠ ODD NUMBER OF RECORDS, NREC=≠,NREC
      GO TO 10
 1010 CONTINUE
      N2=0
 1200 N2=N2+1
            IF(N2.GT.NOBS)GO TO 10
C     UNPACK THE 5 WORD DATA RECORD AND PUT INTO INTER(45)
      DO 1210 I=1 , 45
      N=5*N2-4+AWORD(I)
      IDUM=MASKP(I).AND.INBUF(N)
      ISHIFT=LSHFT(I)
      IF(LCHK(I))GOTO 1210
      IDUM2=MASKR(I).AND..NOT.INBUF(N)
      IF(IDUM2.NE.0B)GOTO1210
      GO TO 1200
 1210 INTER(I)=SHIFT(IDUM,ISHIFT)
C
      IYR=INTER(40)+1800
      CALL CHECK(IYR,LTEST)
      IF(LTEST) GO TO 1200
C
C           FIX LATITUDE (- IS SOUTH)
C
      XLAT=FLOAT(SHIFT(SHIFT(INTER(2),49),-49))/10.0
C
C          FIX LONGITUDE (- IS WEST)
C
      XLON=FLOAT(SHIFT(SHIFT(INTER(3),48),-48))/10.0
      JPR=INTER(1)
      IF (JPR) 1240,1250
 1240 CONTINUE
C
C           DATA SOURCE IS SPOT DATA
C
      PR1=FLOAT(INTER(7))/10.0
      PR2=1.0E3
      IF(PR1.GT.70.0)PR2=900.0
      PRESS=PR1+PR2
      GO TO 1260
 1250 CONTINUE
C
C           DATA SOURCE IS TOF-11
C
      PRESS=(FLOAT(INTER(7))+9.0E3)/10.0
 1260 CONTINUE
C
C           CORRECT FOR SIGN OF AIR TEMRERATURE
C
      TAIR=FLOAT(SHIFT(SHIFT(INTER(8),49),-49))/10.0
```

```
C
C          CORRECT FOR SIGN OF DEWPOINT TEMPERATURE
      TD=FLOAT(SHIFT(SHIFT(INTER(11),53),-53))
      TDUPT=TD
      IF(TD.LE.TAIR.AND.TD.LT.40.0)GO TO 1270
      GO TO 1200
 1270 CONTINUE
      WNDSPD=INTER(20)
C     NOTE WIND IS MN METERS PER SECOND
      IMN=INTER(41)
      ILAT=XLAT
      ILON=XLON
      IF(.NOT.FIRST)GO TO 1280
C
C          INITIALIZE FOR FIRST FILE
      JLAT=ILAT$ .    JLON=ILON
      DO 1272 I=1,3
      SUMDUM(I)=0.0
      SQDUM(I)=0.0
      DO 1272 J=1,100
      DO 1272 K=1,12
      RMEAN(I,J,K)=0.0
      STDEV(I,J,K)=0.0
 1272 MOBS(I,J,K)=0
      DO 1273 K=1,12
      FVIS3(K)=0.0
      FDFT3(K)=0.0
      FMIR3(K)=0.0
 1273 FRAIN3(K)=0.0
      DO 1274 J=1,100
 1274 IWATSUB(J)=0
      NMSUB=0
      NDATTO=0
      JMN=IMN
      JYR=IYR
      SLATMN=0
      SLONMN=0
      SUMLAT2=0
      SUMLON2=0
      SQLAT2=0
      SQLON2=0
      FIRST=.FALSE.
C
 1280 CONTINUE
C
C          CHECK WHETHER MONTH HAS CHANGED
C
      IF(IMN.NE.JMN.OR.IYR.NE.JYR.OR.ILAT.NE.JLAT.OR.ILON.NE.JLON)
     *CALL MNAVG(IMN,JMN,IYR,JYR)
C
C          CHECK WHETHER MARSDEN SUBSQUARE HAS CHANGED
C
      IF(ILAT.NE.JLAT.OR.ILON.NE.JLON)CALL SUBAVG(IMN,JMN,IYR,JYR,
     *IWATSUB,LMSUBSQ)
C
      NDMN=NDMN+1
      NDATA=NDATA+1
```

```
C
      CALL INFRA(WNDSPD,IPW,TAIR,TDUPT,PRESS,IVIS,BVIS,B3,B8,
     A BMIRCL,RNRT)
      IF(B3.GE.0..AND.B8.GE.0..AND.BMIRCL.GE.0..AND.RNRT.GE.0.)GO TO 11
      PRINT *,*B3=*,B3,*  B8=*,B8,*  BMIRCL=*,BMIRCL,*  RNRT=*,RNRT
      GO TO 7771
   11 CONTINUE
      SUMDUM(1)=SUMDUM(1)+B3
      SQDUM(1)=SQDUM(1)+B3*B3
      SUMDUM(2)=SUMDUM(2)+B8
      SQDUM(2)=SQDUM(2)+B8*B8
      SUMDUM(3)=SUMDUM(3)+BMIRCL
      SQDUM(3)=SQDUM(3)+BMIRCL*BMIRCL
C
      CALL RNRATE(IPW,TAIR,IMN,RNRT)
      IF(IVIS.LE.3)NVIS=NVIS+1
      IF(RNRT.GE.2.0)NRAIN=NRAIN+1
      IF(B8.GE.0.8.AND.B8.LE.3.0)NDET=NDET+1
      IF(BMIRCL.GE.0.28.AND.BMIRCL.LE.3.0)NMIR=NMIR+1
      IF(RNRT.GT.10.0)RNRT=10.0
      JJ=RNRT*2+1
      NRNRT(JJ,IMN)=NRNRT(JJ,IMN)+1
C
C     COMPUTE LATITUDE AND LONGITUDE STATISTICS
C
      SUMLAT=SUMLAT+XLAT
      SQLAT=SQLAT+XLAT*XLAT
      SUMLON=SUMLON+XLON
      SQLON=SQLON+XLON*XLON
      GO TO 1200
C
C           COMPUTE STATISTICS FOR ENTIRE MARSDEN SQUARE
C
  777 CONTINUE
      PRINT 600
  600 FORMAT(1H1,35X,*MARSDEN SQUARE MONTHLY CLIMATOLOGICAL VALUES*)
C
      CALL MNAVG(IMN,JMN,IYR,JYR)
      CALL SUBAVG(IMN,JMN,IYR,JYR,IWATSUB,LMSUBSQ)
C
      PRINT 778
  778 FORMAT(1H0,///,1X,*MARSDEN SQUARE*,4X,*QUADRANT*,4X,*MEAN LAT*,5X,
     A*SD LAT*,5X,*MEAN LON*,5X,*SD LON*,5X,*SUBSQUARES*,5X,*OBSERVATION
     AS*)
      SLATMN=SUMLAT2/NMSUB
      SLONMN=SUMLON2/NMSUB
C  TEST THAT SLATMN AND SLONMN ARE IN PROPER RANGES
      IF(SLATMN.GE.-90.0.AND.SLATMN.LE.90.0.AND.SLONMN.GE.-180.0.AND.SLO
     ANMN.LE.180.0) GO TO 610
      PRINT 605, SLATMN,SLONMN
  605 FORMAT(1H0,*BAD POSITION DATA.  LAT = *,F10.2,* LON = *,F10.2)
      GO TO 7771
  610 CONTINUE
      SQLAT2=SQRT(SQLAT2/NMSUB-SLATMN*SLATMN)
      SQLON2=SQRT(SQLON2/NMSUB-SLONMN*SLONMN)
      IQUAD=0
      MSQ=0
```

```
      CALL MARSDEN(SLATMN,SLONMN,IQUAD,MSQ)
      PRINT 779,MSQ,IQUAD,SLATMN,SDLAT2,SLONMN,SDLON2,NMSUB,NOATTO
  779 FORMAT(≠ ≠,I9,12X,I2,8X,2(F6.1,5X),2X,2(F6.1,5X),4X,I3,10X,I7)
      PRINT 780
  780 FORMAT(1H0,40X,≠DISTRIBUTION OF RAINRATE FREQUENCIES (PERCENT)≠,/)
      PRINT 785
  785 FORMAT(2X,≠MONTH≠,≠  <0.5≠,≠  <1.0≠,≠  <1.5≠,≠  <2.0≠,
     A≠  <2.5≠,≠  <3.0≠,≠  <3.5≠,≠  <4.0≠,≠  <4.5≠,≠  <5.0≠,
     A≠  <5.5≠,≠  <6.0≠,≠  <6.5≠,≠  <7.0≠,≠  <7.5≠,≠  <8.0≠,
     A≠  <8.5≠,≠  <9.0≠,≠  <9.5≠,≠ <10.0≠,≠  >=10.0≠/)
      LTEST=.FALSE.
      DO 900 K=1,12
      DO 790 JJ=1,21
      FRNRT3(JJ,K)=-1.0
      IF(NMARSS(K).EQ.0) GO TO 790
      KFLAG=K/3
      IF(K.EQ.KFLAG*3)LTEST=.TRUE.
      FRNRT3(JJ,K)=FRNRT2(JJ,K)/FLOAT(NMARSS(K))
      FRNRT2(JJ,K)=0.0
  790 CONTINUE
      PRINT 800,MONTH(K),(FRNRT3(JJ,K), JJ=1,21)
  800 FORMAT(3X,A3,1X,2P20F6.1,2X,F6.1)
  900 CONTINUE
      IF(LTEST) CALL HISTPLT(FRNRT3,SLATMN,SLONMN,MSQ)
      PRINT 910
  910 FORMAT (1H0,28X,≠CUMULATIVE FREQUENCIES FOR VISIBILITY, DETECTOR,
     AMIRACL AND RAINRATE PARAMETERS (PERCENT)≠,/)
      PRINT 920,(MONTH(K), K=1,12)
  920 FORMAT(15X,12(A3,7X),/)
      DO 930 K=1,12
      IF(NMARSS(K).NE.0) GO TO 925
      FVIS3(K)=-1.0
      FDET3(K)=-1.0
      FMIR3(K)=-1.0
      FRAIN3(K)=-1.0
      NMARSS(K)=1
  925 FVIS3(K)=FVIS3(K)/NMARSS(K)
      FDET3(K)=FDET3(K)/NMARSS(K)
      FMIR3(K)=FMIR3(K)/NMARSS(K)
      FRAIN3(K)=FRAIN3(K)/NMARSS(K)
      NMARSS(K)=0
  930 CONTINUE
      PRINT 940, ≠VIS <= 1.0≠,(FVIS3(K), K=1,12)
      PRINT 940, ≠DET >= 0.8≠,(FDET3(K), K=1,12)
      PRINT 940, ≠MIR >= .28≠,(FMIR3(K), K=1,12)
      PRINT 940, ≠RNR >= 2.0≠,(FRAIN3(K),K=1,12)
  940 FORMAT(1X,A10,2PF8.2,11F10.2)
      DO 950 JJ=1,3
      IF (JJ.EQ.1) PARA=≠  B3  ≠
      IF (JJ.EQ.2) PARA=≠  B8  ≠
      IF (JJ.EQ.3) PARA=≠BMIRCL≠
      PRINT 942, PARA
  942 FORMAT(1H1,36X,≠STATISTICAL VALUES FOR THE ≠,A6,≠ PARAMETER≠)
      PRINT 943, (MONTH(K), K=1,12)
  943 FORMAT(1H0,≠SUBSQUARE≠,6X,12(A3,7X),/)
      DO 949 K=1,100
      PRINT 946, K-1,(RMEAN(JJ,K,I), I=1,12)
```

```
946 FORMAT (1X,I6,2X,≠MEAN≠,F6.2,11F10.2)
    PRINT 947, (STDEV(JJ,K,I), I=1,12)
947 FORMAT (9X,≠SDEV≠,F6.2,11F10.2)
    PRINT 948, (MOBS(JJ,K,I), I=1,1?)
948 FORMAT (9X,≠OBS≠,I7,11(2X,I8),/)
949 CONTINUE
950 CONTINUE
    PRINT 952, MSQ
952 FORMAT (1HC,≠SUBSQUARES NOT REPORTING FOR SQUARE ≠,I4,//)
    DO 960 K=1,100
    IF(IHATSUB(K).EQ.1) GO TO 960
    PRINT *,≠MARSDEN SUBSQUARE ≠,K-1,≠ HAD NO REPORTS?
960 CONTINUE
    CALL WRITEND(0)
7771 CONTINUE
    STOP
    END
```

```
      BLOCKDATA BMASK
      COMMON/BLIND/MASKR(45),LSHFT(45)
      DATA (MASKR(I),I=1,10)/
     ^               40000000000000000000B,
     ^               37770000000000000000B,
     ^               00007777000000000000B,
     ^               00000000600000000000B-
     ^               00000000017000000000B,
     ^               00000000000740000000B,
     ^               00000000000377700000B,
     ^               00000000000000777600B,
     ^               00400000000000000017B,
     ^               77000000000000000000B/
      DATA (MASKR(I),I=11,20)/
     ^               00774000000000000000B,
     ^               00037760000000000000B,
     ^               00000001400000000000B,
     ^               00000000370000000000B,
     ^               00000000000770000000B,
     ^               00000000000074000000B,
     ^               00000000000003740000B,
     ^               00000000000000376000B,
     ^               00000000000000000177B,
     ^               77400000000000000000B/
      DATA (MASKR(I),I=21,30)/
     ^               00360000000000000000B,
     ^               00017000000000000000B,
     ^               00000740000000000000B,
     ^               00000036000000000000B,
     ^               00000001700000000000B,
     ^               00000000074000000000B,
     ^               00000000000360000000B,
     ^               00000000000017700000B,
     ^               00000000000000740000B,
     ^               00000000000000002000B/
      DATA (MASKR(I),I=31,40)/
     ^               00000000000000001600B,
     ^               00000000000000007000B,
     ^               00000000000000000777B,
     ^               40000000000000000000B,
     ^               34000000000000000000B,
     ^               03740000000000000000B,
     ^               00037700000000000000B,
     ^               00000777700000000000B,
     ^               00000000007700000000B,
     ^               00000000000077740000B/
      DATA (MASKR(I),I=41,45)/
     ^               00000000000000036000B,
     ^               00000000000000017400B,
     ^               00000000000000000037B,
     ^               77777777777700000000B,
     ^               00000000000777777777B/
      DATA LSHFT/
     ^1,12,24,26,33,34,45,56,6,
     ^6,13,23,25,30,36,40,46,53,0,
     ^7,11,15,19,23,27,31,35,42,46,47,48,51,0,
     ^1,4,10,18,30,36,46,50,55,0,
     ^36,0/
      END
```

```
      SUBROUTINE CHECK(IYR,LTEST)
C
C          CHECK THAT YR IS WITHIN 5 OF 1968
C
      LOGICAL LTEST
C
      JYR=IABS(IYR-1968)-5
      IF(JYR)40,40,777
   40 CONTINUE
      LTEST=.FALSE.
      RETURN
  777 LTEST=.TRUE.
      RETURN
      END
```

```
      SUBROUTINE MNAVG(IMN,JMN,IYR,JYR)
      COMMON/AVG/FVIS1(12),FRAIN1(12),FDET1(12),FMIR1(12),
     *NVIS,NRAIN,NDET,NMIR,NRNRT(21,12),
     *NMN(12),NDMN,SUMLAT,SUMLON,SQLAT,SQLON,
     *NREC,NDATA,ILAT,JLAT,ILON,JLON,MONTH(12),
     *FRNRT1(21,12),FRNRT2(21,12),NMARSS(12),NMSUB,
     *SUMLAT2,SUMLON2,SQLAT2,SQLON2,NDATTO,
     *FVIS3(12),FDET3(12),FMIR3(12),FRAIN3(12),
     *RMEAN(3,100,12),STDEV(3,100,12),MOBS(3,100,12),
     *SUMDUM(3),SQDUM(3)
C
C          DO AVERAGES FOR CHANGE OF MONTH
C
      IF(NDMN.EQ.0)RETURN
      M=JMN
      FVIS1(M)=FVIS1(M)+FLOAT(NVIS)/NDMN
      FRAIN1(M)=FRAIN1(M)+FLOAT(NRAIN)/NDMN
      FDET1(M)=FDET1(M)+FLOAT(NDET)/NDMN
      FMIR1(M)=FMIR1(M)+FLOAT(NMIR)/NDMN
      DO 8000 JJ=1,21
      FRNRT1(JJ,M)=FRNRT1(JJ,M)+FLOAT(NRNRT(JJ,M))/NDMN
      NRNRT(JJ,M)=0
 8000 CONTINUE
C             COMPUTE MONTHLY MEAN AND ST. DEV. FOR  PARAMETER
      DO 8010 JJ=1,3
      RMEAN(JJ,100,M)=RMEAN(JJ,100,M)+SUMDUM(JJ)
      STDEV(JJ,100,M)=STDEV(JJ,100,M)+SQDUM(JJ)
      MOBS(JJ,100,M)=MOBS(JJ,100,M)+NDMN
      SUMDUM(JJ)=0.0
      SQDUM(JJ)=0.0
 8010 CONTINUE
      NVIS=  NRAIN=  NDET=  NMIR=  0
      NDMN=0
      NMN(M)=NMN(M)+1
      JMN=IMN
      JYR=IYR
      RETURN
      END
```

```
      SUBROUTINE SUBAVG(IMN,JMN,IYR,JYR,IWATSUB,LMSUBSQ)
      COMMON/AVG/FVIS1(12),FRAIN1(12),FDET1(12),FMIR1(12),
     ANVIS,NRAIN,NDET,NMIR,NRNRT(21,12),
     ANMN(12),NDMN,SUMLAT,SUMLON,SQLAT,SQLON,
     ANREC,NDATA,ILAT,JLAT,ILON,JLON,MONTH(12),
     AFRNRT1(21,12),FRNRT2(21,12),NMARSS(12),NMSUB,
     ASUMLAT2,SUMLON2,SQLAT2,SQLON2,NDATTO,
     AFVIS3(12),FDET3(12),FMIR3(12),FRAIN3(12),
     ARMEAN(3,100,12),STDEV(3,100,12),MOBS(3,100,12),
     ASUMDUM(3),SODUM(3)
      DIMENSION IWATSUB(100)
C
C           DO AVERAGE FOR WHOLE MARSDEN SUBSQUARE
C
      NMSUB=NMSUB+1
      XLATMN=SUMLAT/NDATA
      XLONMN=SUMLON/NDATA
C
      LATMN=(XLATMN+90.0)*10.0
      LONMN=(XLONMN+360.0)*10.0
      IF(LONMN.GE.3600) LONMN=LONMN-3600
C
      SUMLAT2=SUMLAT2+XLATMN
      SUMLON2=SUMLON2+XLONMN
      SQLAT2=SQLAT2+XLATMN*XLATMN
      SQLON2=SQLON2+XLONMN*XLONMN
C  DETERMINE MARSDEN SUBSQUARE
      LAT=ABS(XLATMN)
      LON=ABS(XLONMN)
      LAT=LAT-LAT/10*10
      LON=LON-LON/10*10
      MSUBSQ=LAT*10+LON+1
      IWATSUB(MSUBSQ)=1
C  COMPUTE PARAMETER VALUES FOR SUBSQUARE
      DO 9981 M=1,12
      IF(NMN(M).EQ.0) GO TO 9079
      NMARSS(M)=NMARSS(M)+1
      FVIS2=FVIS1(M)/NMN(M)
      FVIS3(M)=FVIS3(M)+FVIS2
      FRAIN2=FRAIN1(M)/NMN(M)
      FRAIN3(M)=FRAIN3(M)+FRAIN2
      FDET2=FDET1(M)/NMN(M)
      FDET3(M)=FDET3(M)+FDET2
      FMIR2=FMIR1(M)/NMN(M)
      FMIR3(M)=FMIR3(M)+FMIR2
      DO 9077 JJ=1,21
      FRNRT2(JJ,M)=FRNRT2(JJ,M)+FRNRT1(JJ,M)/FLOAT(NMN(M))
      FRNRT1(JJ,M)=0.0
 9077 CONTINUE
      DO 9078 JJ=1,3
      RMEAN(JJ,MSUBSQ,M)=RMEAN(JJ,100,M)/MOBS(JJ,100,M)
      R1=STDEV(JJ,100,M)/MOBS(JJ,100,M)
      R2=RMEAN(JJ,MSUBSQ,M)*RMEAN(JJ,MSUBSQ,M)
      IR1=R1*1000.0
      IR2=R2*1000.0
      R1=IR1/1000.0
      R2=IR2/1000.0
```

```
      STDEV(JJ,MSUBSQ,M)=SQRT(R1-R2)
      MOBS(JJ,MSUBSQ,M)=MOBS(JJ,100,M)
C
      IF(MSUBSQ.EQ.100) GO TO 9078
C
      RMEAN(JJ,100,M)=0.0
      STDEV(JJ,100,M)=0.0
      MOBS(JJ,100,M)=0
 9078 CONTINUE
 9079 CONTINUE
      NMN(4)=0
      FVIS1(M)=0
      FRAIN1(M)=0
      FDET1(M)=0
      FMIR1(M)=0
 9080 CONTINUE
C
      IF(NMSUB.EQ.1) LMSUBSQ=0
      CALL PACK(LATMN,LONMN,MSUBSQ,RMEAN,STDEV,MOBS)
C
      LMSUBSQ=MSUBSQ
C
      NDATTO=NDATTO+NDATA
      SUMLAT=0
      SQLAT=0
      SUMLON=0
      SQLON=0
      NDATA=0
      NVIS=NRAIN=NDET=NMIR=0
      NREC=0
C
C          RESET EVERYTHING FOR A NEW MARSDEN SUBSQUARE
C
      NOMN=0
      JLAT=ILAT$      JLON=ILON
      JYR=IYR
      JMN=IMN
      RETURN
      END
```

```
      SUBROUTINE INFRA(WSMPS,IPW,TAIR,TDUPT,P,JVIS,BVIS,B3,B8,
     ^ BMIRCL,PNRT)
      COMMON /AA/C(20,6)
      DIMENSION VIS(10)
      DATA VIS/.025,.125,.35,.75,1.5,3.0,7.0,15.0,35.0,50.0/
C     TDUPT- DEW POINT IN DEGREES C
C     WSMPS- WIND SPEED IN M S-1
C     IPW- PRESENT WEATHER INDICATOR (SEE TDF-11 DESCRIPTION)
C     P- PRESSURE IN MILLIBARS
      JJJ=JVIS-89
      VISIB=VIS(JJJ)
      IF(JVIS.LT.10)VISIB=VIS(JVIS+1)
      CALL MUNN(WSMPS,IPW,TAIR,TDUPT,P,VISIB,
     *ETRB4,ET5,ES1,BMIRCL)
      BVIS=ES1
      B3=ETRB4
      B8=ET5
 1000 FORMAT(* *,F4.1,I3,2F4.1,F6.1,F3.0,3E12.6)
  100 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE MUNN(WIND,IWEAT,TAIR,TO,P,VISIB,ETRB4,ET5,ES1,BMIRCL)
      DIMENSION WL(7),ALPHA3(8),ALPHA8(3),A(7)
      COMMON/AA/C(20,6)
      DATA WL/ .55,1.06,.5,1.1,7.75,11.75,3.8/
      DATA A/6.107799961,4.436518521E-1,1.428945805E-2,2.605648471E-4,
     A3.031240396E-6,2.034080948E-8,6.136820929E-11/
      EVAP(T)=A(1)+T*(A(2)+T*(A(3)+T*(A(4)+T*(A(5)+T*(A(6)+T*A(7))))))
      RELH (EDUPT,ETSAT,P)=100.*EDUPT/ETSAT*(P-ETSAT)/(P-EDUPT)
C     CONVERT    TO    M/SEC
      AVWSD=WIND
      E1= EVAP(TO)
      E2=EVAP(TAIR)
      RH=RELH(E1,E2,P)
      IF(RH.GT.99.5) RH=99.5
      CALL AEXTC(ES1,ES2,ES3,ES4,ES5,VISIB,IWEAT,AVWSD,RH)
C       CALCULATE ABSOLUTE HUMIDITY
      AHGM=.622E3*E1/(P-E1)
      IF(AHGM.LT.0.0)PRINT*,AHGM,E1,TD
      CALL ABSORB(TAIR,P,RH,ALPHA3,ALPHA8,AHGM)
      ETRB4=ES4+ALPHA3(4)
      ET5=ES5+ALPHA8(3)
      CALL MIRACL(TAIR,E1,BMIRCL)
      RETURN
      END
```

```
      SUBROUTINE ABSORB(TAIR,AP,RH,ALPHA3,ALPHA8,AHGM)
      DIMENSION ALPHA3(8),ALPHA8(3),E(4,3),T(4,8)
      DATA (E(I,1),I=1,4)/.4477E-07,-.1930E-08,.6199E-08,-.2597E-10/
      DATA (E(I,2),I=1,4)/.024019,.003258,0.,0./
      DATA (E(I,3),I=1,4)/.009909,.000085,0.,0./
      DATA (T(I,1),I=1,4)/.1867E-08,.4210E-08,.7433E-10,-.1310E-11/
      DATA (T(I,2),I=1,4)/.04609,-.8715E-04,0.,0./
      DATA (T(I,3),I=1,4)/.05872,.00059,0.,0./
      DATA (T(I,4),I=1,4)/.01132,.00018,0.,0./
      DATA (T(I,5),I=1,4)/.3599E-08,.1032E-07,.2037E-09,-.2688E-11/
      DATA (T(I,6),I=1,4)/.02884,-.5356E-04,0.,0./
      DATA (T(I,7),I=1,4)/.0284,.00034,0.,0./
      DATA (T(I,8),I=1,4)/.01078,.000104,0.,0./
C     THIS SUBROUTINE USES AIR TEMPERATURE (TAIR) AND AIR PESSURE (AP)
C     AND RELATIVE HUMIDITY (RH) TO CALCULATE MOLECULAR ABSORPTION
C     COEFFICIENT FOR 3.8, 5.AND 10.59 MICRONS
C     TEMPERATURE DATA IN CENTIGRADE NEEDS CONVERSION TO BOTH KELVIN
C     AND DEG.F
      T1=TAIR+273.
      T2=T1*EXP(1800./T1)
C     7.75-11.75 MOLECULAR ABS IN /KM AT 10KM 293KELVIN
C     H2O CONTINUUM ABS.
      ALPHA8(1)=T2*(E(1,1)+AHGM*(E(2,1)+AHGM*(E(3,1)+E(4,1)*AHGM)))
C     MIXED GASES LINE ABS.
      TP=TAIR-20.
      ASQ=SQRT(AHGM)
      ALPHA8(2)=E(1,2)+TP*E(2,2)+(E(1,3)-E(2,3)*TP)*ASQ
C     TOTAL 7.75-11.75 MOLECULAR EXTINCTION
      ALPHA8(3)=ALPHA8(1)+ALPHA8(2)
C     3.4-5.0 MOLECULAR ABS. IN /KM AT 10KM   293 KELVIN
C     H2O CONTINUUM ABS.
      ALPHA3(1)=T2*(T(1,1)+AHGM*(T(2,1)+AHGM*(T(3,1)+T(4,1)*AHGM)))
C     N2 CONTINUUM ABS.
      ALPHA3(2)=T(1,2)+T(2,2)*T1
C     MIXED GASES LINE ABS.
      ALPHA3(3)=T(1,3)+T(2,3)*TP+(T(1,4)-T(2,4)*TP)*ASQ
C     TOTAL 3.4-5.0 MOLECULAR EXTINCTION  293 KELVIN
      ALPHA3(4)=ALPHA3(1)+ALPHA3(2)+ALPHA3(3)
C     3.4-5.0 MOLECULAR ABS. IN /KM AT 10KM   6000 KELVIN
C      H2O CONTINUUM ABSORPTION
      ALPHA3(5)=T2*(T(1,5)+AHGM*(T(2,5)+AHGM*(T(3,5)+T(4,5)*AHGM)))
C     N2 CONTINUUM ABS.
      ALPHA3(6)=T(1,6)+T(2,6)*T1
C     MIXED GASES LINE ABS.
      ALPHA3(7)=T(1,7)+T(2,7)*TP+(T(1,8)-T(2,8)*TP)*ASQ
C      TOTAL 3.4-5 MOLECULAR EXTINCTION 6000 KELVIN
      ALPHA3(8)=ALPHA3(5)+ALPHA3(6)+ALPHA3(7)
      RETURN
      END
```

```
      SUBROUTINE AEXTC(EC1,EC2,EC3,EC4,EC5,VIS,IW,AVREAL,RH)
      COMMON/AA/C(20,6)
      FU(X,C,I)=C(I,1)+X*(C(I,2)+X*(C(I,3)+X*(C(I,4)+X*(C(I,5)+C(I,6)*X)
     A)))
C       WIND BIAS CORRECTION
      AV=AVREAL-3.5
      IF(AV.LT.0.5)AV=.5
      IF(AV.GT.21.) AV=21.
C
C                NO RH BELOW 30.0 PERCENT
C
      IF (RH.LT.30.0)RH=30.0
      IF(VIS.LT.1.) GO TO 50
      IF(IW.LT.50) GO TO 10
      IF(IW.GE.50.AND.IW.LE.59) GO TO 15
      IF(IW.GE.60.AND.IW.LE.61.OR.IW.EQ.80) GO TO 16
      IF(IW.GE.62.AND.IW.LE.63.OR.IW.EQ.81) GO TO 17
      IF(IW.GE.64.AND.IW.LE.65.OR.IW.EQ.82) GO TO 18
   15 S1=S2=S3=S4=S5=.035
      GO TO 10
   16 S1=S2=S3=S4=S5=.2
      GO TO 10
   17 S1=S2=S3=S4=S5=.60
      GO TO10
   18 S1=1.19
      S2=1.27
      S3=1.27
      S4=1.19
      S5=1.6
   10 IF(AV.GE.7.) GO TO20
      EC1=FU(AV,C,1)*FU(RH,C,2)
      EC2=FU(AV,C,5)*FU(RH,C,6)
      EC3=FU(AV,C,9)*FU(RH,C,10)
      EC4=FU(AV,C,13)*FU(RH,C,14)
      EC5=FU(AV,C,17)*FU(RH,C,18)
      GO TO 150
   20 EC1=FU(AV,C,3)*FU(RH,C,4)
      EC2=FU(AV,C,7)*FU(RH,C,8)
      EC3=FU(AV,C,11)*FU(RH,C,12)
      EC4=FU(AV,C,15)*FU(RH,C,16)
      EC5=FU(AV,C,19)*FU(RH,C,20)
  150 IF(IW.LT.50) GO TO 200
      EC1=EC1+S1
      EC2=EC2+S2
      EC3=EC3+S3
      EC4=EC4+S4
      EC5=EC5+S5
      GO TO 200
   50  EXT=3.91/VIS
      EC1=EC2=EC3=EC4=EC5=EXT
  200 CONTINUE
  990 FORMAT(* BIASED WND*,2F6.1,5E10.3)
      RETURN
      END
```

```
      BLOCK DATA AEROSOL
      COMMON/AA/C(20,6)
       DATA  ((C(II,JJ),JJ=1,6),II=1,5)/
     A        .8065629E+03,       .4852030E-01,       .5359734E-02
     A,      0.          ,       0.          ,       0.
     A,      -.4072407E+01,       .3865717E+00,      -.1405736E-01
     A,       .2496362E-03,      -.2168010E-05,       .7388672E-08
     A,      -.8504248E+01,       .3782149E+01,      -.6052896E+00
     A,       .4835776E-01,      -.1915719E-02,       .3078907E-04
     A,      -.6135796E+01,       .5839620E+00,      -.2124833E-01
     A,       .3777016E-03,      -.3284040E-05,       .1120986E-07
     A,       .7657225E+00,       .7225769E-01,       .8462759E-02
     A,      0.          ,       0.          ,       0.
     A/
      DATA  ((C(II,JJ),JJ=1,6),II=6,10)/
     A       -.2932706E+01,       .2777654E+00,      -.1010003E-01
     A,       .1797614E-03,      -.1557875E-05,       .5310979E-08
     A,      -.1115328E+02,       .4851545E+01,      -.7779677E+00
     A,       .6219585E-01,      -.2462208E-02,       .3943458E-04
     A,      -.5081195E+01,       .4834412E+00,      -.1759776E-01
     A,       .3129826E-03,      -.2723047E-05,       .9302511E-08
     A,       .6362647E+00,       .8998343E-01,       .1030844E-01
     A,      0.          ,       0.          ,       0.
     A,      -.2409413E+01,       .2282222E+00,      -.8298742E-02
     A,       .1473765E-03,      -.1280098E-05,       .4364282E-08
     A/
      DATA  ((C(II,JJ),JJ=1,6),II=11,15)/
     A       -.1191221E+02,       .5131701E+01,      -.8202049E+00
     A,       .6541864E-01,      -.2584433E-02,       .4134640E-04
     A,      -.4684810E+01,       .4457416E+00,      -.1622222E-01
     A,       .2884387E-03,      -.2508542E-05,       .8565929E-08
     A,       .4483040E+00,       .9442862E-01,       .2935320E-01
     A,      0.          ,       0.          ,       0.
     A,      -.1095481E+01,       .1033288E+00,      -.3756766E-02
     A,       .6671195E-04,      -.5794095E-06,       .1975027E-08
     A,      -.1539448E+02,       .6565226E+01,      -.1065084E+01
     A,       .8645294E-01,      -.3472824E-02,       .5677501E-04
     A/
      DATA  ((C(II,JJ),JJ=1,6),II=16,20)/
     A       -.3626042E+01,       .3432499E+00,      -.1248614E-01
     A,       .2219188E-03,      -.1929501E-05,       .6587247E-08
     A,       .5729923E+00,       .4037501E-01,       .3317870E-01
     A,      0.          ,       0.          ,       0.
     A,      -.4900894E+00,       .4627000E-01,      -.1682449E-02
     A,       .2986225E-04,      -.2591813E-06,       .8825615E-09
     A,      -.2255837E+02,       .9991363E+01,      -.1711637E+01
     A,       .1462984E+00,      -.6203601E-02,       .1073875E-03
     A,      -.1985498E+01,       .1872385E+00,      -.6808950E-02
     A,       .1209162E-03,      -.1050134E-05,       .3578883E-08
     A/
      END
```

```
      SUBROUTINE MIRACL(T,E1,BMIRCL)
C          CALCULATION OF EXTINCTION COEFFICEINT FOR MIRACL SPECTRUM
C          BASED ON SAI ALGORITHMS
C
      DIMENSION A(9)
      DATA A/
     * 9.4351E-02,  -3.2344E-04,   1.7890E-01,
     * 1.0080E-03,  -7.0357E-06,  -1.0417E-03,
     * 2.6804E-07,   1.5392E-06,   1.2311E-08/
C
C          CONVERT WATER VAPOUR PRESSURE IN MB TO TORR
C
      P=E1*1.333222
      TK=T+273.15
      BMIRCL= A(1) + A(2)*TK + A(3)*P +
     * (A(4)+A(5)*TK)*P*P + A(6)*TK*P +
     * (A(7)+P*(A(8)+P*A(9)))*TK*TK
      RETURN
      END
```

```
      SUBROUTINE RNRATE(IPH,TAIR,IMN,RNRT)
      DIMENSION RR(100),AA(12),BB(12),CC(12)
C         EVALUATION OF RAIN RATE USING
C         TUCKERSS ALGORITHM, AND TEMPERATURE CORRECTION OF
C         DORMAN AND BOURKES.
      DATA AA / 0.973, 0.941, 0.804, 0.720, 0.489, 0.726,
     A         1.734, 1.115, 0.548, 0.671, 0.896, 0.985/
      DATA BB / 4.69E-2, 4.12E-2, 4.04E-2, 6.03E-2, 6.78E-2,-1.03E-1,
     A        -2.362E-1,-1.217E-1, .006, .0421, .0731, .0662/
      DATA CC / 3.52E-3, 2.07E-3, 1.29E-4, 4.20E-5, 1.20E-5, 8.89E-3,
     A        1.19E-2, 8.15E-3, 5.14E-3, 2.934E-3, 1.35E-3, 1.15E-3/
      DATA RR /51*0.0,
     A       0.31, 0.31, 0.62, 1.88, 3.77, 0.31, 0.94, 0.31, 0.94,
     A 0.31, 0.62, 0.94, 1.88, 1.35, 2.71, 0.62, 2.29, 0.62, 2.29,
     A 0.31, 0.62, 0.94, 1.88, 1.35, 2.71, 0.00, 0.00, 0.00, 0.00,
     A 0.31, 0.94, 1.35, 0.31, 1.15, 0.31, 1.15, 0.31, 2.29, 0.31,
     A 2.29, 0.62, 2.29, 0.62, 2.29, 1.28, 1.28, 2.71, 0.00, 2.71/
C         0     1     2     3     4     5     6     7     8     9
      RNRT=RR(IPH+1)*(AA(IMN)+TAIR*(BB(IMN)+TAIR*CC(IMN)))
      RETURN
      END
```

```
      SUBROUTINE HISTPLT(FRNRT3,SLATMN,SLONMN,MSQ)
      DIMENSION HLABL(3),VLABL(4)
      DIMENSION FRNRT3(21,12)
      DIMENSION CRNRT3(21,12)
      DIMENSION MONTH(12)
      LOGICAL LTEST,CTEST
      DATA MONTH/≠JAN≠,≠FEB≠,≠MAR≠,≠APR≠,≠MAY≠,≠JUN≠,
     *≠JUL≠,≠AUG≠,≠SEP≠,≠OCT≠,≠NOV≠,≠DEC≠/
      HLABL(1)=≠AVERAGE RA≠
      HLABL(2)=≠INRATE (MM≠
      HLABL(3)=≠/HR)≠
      VLABL(1)=≠          ≠
      VLABL(2)=≠ FREQUENCY≠
      VLABL(3)=≠ OF OCCURR≠
      VLABL(4)=≠ENCE≠
      RMSQ=MSQ
      ISLAT=SLATMN
      ISLON=SLONMN
C
C       PLOT HISTOGRAMS OF RAINRATE FREQUENCIES FOR MARSDEN SQUARE
C
C            CTEST IS TRUE IF CUMULATIVE PLOTS CAN BE MADE
C            CTEST IS FALSE IF CUM FREQUENCY IS OUT OF RANGE: NO PLOTS
C
C            LTEST IS FALSE WHEN PLOTTING NONCUMULATIVE STATS
C            LTEST IS TRUE WHEN PLOTTING CUMULATIVE STATS
C
      LTEST=.FALSE.
      CTEST=.TRUE.
C           CALCULATE DATA MAXIMUM AND CONVERT RAINRATE TO PERCENT
      P1=0.0
      P2=100.0
      DO 20 IM=1,12
      FRNRT3(1,IM)=FRNRT3(1,IM)*100
      IF(FRNRT3(1,IM).GT.100.0) FRNRT3(1,IM)=100.0
      CRNRT3(1,IM)=FRNRT3(1,IM)
      P2=AMIN1(P2,CRNRT3(1,IM))
      DO 20 J=2,21
      P1=AMAX1(P1,FRNRT3(J,IM))
      FRNRT3(J,IM)=FRNRT3(J,IM)*100
      IF(FRNRT3(J,IM).GT.100.0) FRNRT3(J,IM)=100.0
      CRNRT3(J,IM)=FRNRT3(J,IM)+CRNRT3(J-1,IM)
      IF(CRNRT3(J,IM).GT.100.0) CRNRT3(J,IM)=100.0
   20 CONTINUE
C
C           PRODUCE TABLE OF CUMULATIVE RAINRATES
C
      PRINT 105
  105 FORMAT (1H0,45X,≠RAINRATE CUMULATIVE FREQUENCIES (PERCENT)≠,//)
      DO 120 IM=1,12
      PRINT 115, MONTH(IM),(CRNRT3(J,IM),J=1,21)
  115 FORMAT (3X,A3,1X,20F6.1,2X,F6.1)
  120 CONTINUE
C
C           CHOOSE THE PROPER SCALING FACTORS
C
      VSCALE=1.0
```

```
      IF (P1.GT.0.05) VSCALE=0.5
      IF (P1.GT.0.10) VSCALE=0.25
      IF (P1.GE.0.0.AND.P1.LE.0.20) GO TO 30
      PRINT *,≠NO PLOT, FREQUENCY OF RAINRATE = ≠,P1,≠ VSCALE = ≠,VSCALE
      RETURN
   30 CONTINUE
      CSCALE=1.0
      IF (P2.LT.95.0) CSCALE=0.5
      IF (P2.LT.90.0) CSCALE=0.25
      IF (P2.GE.80.0.AND.P2.LE.100.0) GO TO 35
      PRINT *,≠NO CUMULATIVE PLOT, CUM FREQUENCY = ≠,P2
      CTEST=.FALSE.
 35   CONTINUE
C
C             DRAW AXES OF GRAPH
C
      CALL VOPEN(9)
      DO 100 IM=3,12,3
   40 CONTINUE
      IF (.NOT.LTEST) CALL OFFSETV(-2.0,0.7,-9.2,0.7)
      IF (.NOT.LTEST) VLABL(1)=≠           ≠
      IF (LTEST.AND.CTEST) VLABL(1)=≠CUMULATIVE≠
      IF (LTEST.AND.CTEST) CALL OFFSETV(-2.0,0.7,-2.6,0.7)
      IF(LTEST.AND..NOT.CTEST) GO TO 100
      VINT=0.2
      HINT=0.34
C    DRAW X-AXIS
      XGR=0.0
      CALL VP(XGR,0.0,0)
      DO 70 IX=1,21
      INUM=IX/2
      XNUM=INUM
      XGR=XGR+HINT
      CALL VP(XGR,0.0,1)
      CALL VP(XGR,0.1,0)
      CALL VP(XGR,-0.1,1)
      IF(INUM*2.EQ.IX)CALL VNUM(XGR-.06,-0.3,.14,XNUM,0.0,-1)
      CALL VP(XGR,0.0,0)
   70 CONTINUE
C   DRAW Y-AXIS
      YGR=0.0
      CALL VP(0.0,YGR,0)
      DO 80 IY=1,25
      YNUM=IY*.2/VSCALE
      IF(LTEST) YNUM=YNUM+(100-1/CSCALE*5)
      YGR=YGR+VINT
      CALL VP(0.0,YGR,1)
      CALL VP(0.1,YGR,0)
      CALL VP(-0.1,YGR,1)
      IF(MOD(IY,5).EQ.0)CALL VNUM(-.6,YGR-.07,.14,YNUM,0.0,1)
      CALL VP(0.0,YGR,0)
   80 CONTINUE
C
C  DRAW GRAPHS OF BOTH RAINRATES (FREQ AND CUM FREQ)
C
      BGR=(CRNRT3(1,IM)-(100-1/CSCALE*5))*CSCALE
      IF(LTEST) CALL VP(0.17,BGR,0)
```

```
      DO 89 I=1,21
      XGR=(I-1)*HINT+.07
      YGR=FRNRT3(I,IM)*VSCALE
      IF(LTEST) YGR=(CRNRT3(I,IM)-(100-1/CSCALE*5))*CSCALE
      IF(YGR.GT.5.0) GO TO 89
      IF (.NOT.LTEST) GO TO 82
      CALL VP(XGR+0.1,YGR,2)
      CALL VP(XGR+0.1,YGR,-8)
      GO TO 89
   82 CONTINUE
      CALL VP(XGR,0.0,0)
      CALL VP(XGR,YGR,1)
      CALL VP(XGR+.2,YGR,1)
      CALL VP(XGR+.2,0.0,1)
      CALL VLMASK(25252525252525252525B)
      DO 85 J=1,21
      CALL VLINE(XGR,0.0,YGR)
      XGR=XGR+0.01
   85 CONTINUE
 89   CONTINUE
C
C        DRAW LABELS
C
      CALL VCHAR(2.5,-0.7,0.14,HLABL,0.0,24)
      CALL VCHAR(-0.8,0.5,0.14,VLABL,90.0,34)
      KLABL=≠MON    SQR≠
      LLABL=≠LAT    LON≠
      LATL=≠N≠
      LONL=≠E≠
      IF(ISLAT.GE.0.0) GO TO 97
      LATL=≠S≠
      ISLAT=-ISLAT
   97 IF(ISLON.GE.0.0) GO TO 98
      LONL=≠W≠
      ISLON=-ISLON
   98 ENCODE(3,99,NLATL)ISLAT,LATL
   99 FORMAT (I2,A1)
      ENCODE(4,101,NLONL)ISLON,LONL
  101 FORMAT (I3,A1)
      CALL VCHAR(5.0,3.0,0.21,KLABL,0.0,10)
      CALL VCHAR(4.9,2.5,0.28,MONTH(IM),0.0,3)
      CALL VNUM(6.3,2.5,0.28,RMSQ,0.0,-1)
      CALL VCHAR(5.0,2.0,0.21,LLABL,0.0,10)
      CALL VCHAR(4.8,1.5,0.28,NLATL,0.0,3)
      CALL VCHAR(5.9,1.5,0.28,NLONL,0.0,4)
      IF(CTEST) LTEST=.NOT.LTEST
      IF(CTEST.AND.LTEST) GO TO 40
      CALL VCLEAR(5)
  100 CONTINUE
  140 CONTINUE
      CALL VTALLY
      RETURN
      END
```

```
      SUBROUTINE MARSDEN(SLATMN,SLONMN,IQUAD,MSQ)
C     DETERMINE MARSDEN SQUARE NUMBER BASED ON MEAN POSITION
      LAT=SLATMN
      IF (SLONMN) 30,30,40
   30 LON=-SLONMN
      GO TO 50
   40 LON=359.999-SLONMN
   50 LON=LON/10
      LAT=LAT/10
      IF (SLATMN.LT.0.0.OR.SLATMN.GE.80.0) GO TO 60
      MSQ=1+LAT*36+LON
      GO TO 80
   60 IF (SLATMN.LT.0.0) GO TO 70
      MSQ=901+LON
      GO TO 80
   70 IF (LAT.LT.0) LAT=-LAT
      MSQ=300+LAT*36+LON
C     DETERMINE GLOBAL QUADRANT THAT THE SQUARE IS IN
   80 IF (SLATMN.GE.0.0.AND.SLONMN.GE.0.0) IQUAD=1
      IF (SLATMN.LT.0.0.AND.SLONMN.GE.0.0) IQUAD=3
      IF (SLATMN.LT.0.0.AND.SLONMN.LT.0.0) IQUAD=5
      IF (SLATMN.GE.0.0.AND.SLONMN.LT.0.0) IQUAD=7
      RETURN
      END
```

```
      SUBROUTINE PACK(LATMN,LONMN,MSUBSQ,RMEAN,STDEV,MOBS)
      DIMENSION IT(12)
      DIMENSION RMEAN(3,100,12)
      DIMENSION STDEV(3,100,12)
      DIMENSION MOBS(3,100,12)
      IF(MSUBSQ.GT.100) GO TO 400
C
C        PACK SUBSQUARE DATA ONTO TAPE FOR USE BY PROGRAM ANALYSIS
C
C         DATA FOR THREE PARAMETERS IS PACKED
C                 JJ=1 FOR THE B3 PARAMETER
C                 JJ=2 FOR THE B8 PARAMETER
C                 JJ=3 FOR THE BMIRCL PARAMETER
C
      L1=1795-LATMN/10*10
      L2=LONMN/10*10+5
      CALL RECOUTA(L1,L2,0)
      DO 150 JJ=1,3
      DO 100 M=1,12
      IF(RMEAN(JJ,MSUBSQ,M).EQ.0.)90,95
   90 IT(M)=0
      GO TO 100
   95 IT(M)=RMEAN(JJ,MSUBSQ,M)*100.+200.
  100 CONTINUE
  150 CALL RECOUTB(0,JJ,IT)
      DO 250 M=1,12
  250 IT(M)=MOBS(1,MSUBSQ,M)
      CALL RECOUTB(1,1,IT)
      DO 350 JJ=1,3
      DO 300 M=1,12
      IF(STDEV(JJ,MSUBSQ,M).EQ.0.)290,295
  290 IT(M)=0
      GO TO 300
  295 IT(M)=STDEV(JJ,MSUBSQ,M)*100.
  300 CONTINUE
  350 CALL RECOUTB(JJ,2,IT)
  400 RETURN
      END
```

SUBROUTINE RECOUTA   73/74   OPT=1   FTN 4.6+446   12/04/80 22.06.16   PAGE 1

```
      SUBROUTINE RECOUTA(L1,L2,T)
      DIMENSION IN(12),IT(4),T(12)
      COMMON/BUG/IBUG
      LOGICAL ISW
      INTEGER T
      DATA(IN=48,60,72,84,96,108,120,132,144,156,168,180   )
      CALL SBIT(IT,L1,0,12)
      CALL SBIT(IT,L2,12,12)
      IF(IBUG.NE.0) PRINT 2000,900-L1,L2
      RETURN
 2000 FORMAT(1X,2I4)
      ENTRY RECOUTB
      CALL SBIT(IT,L1,24,6)
      CALL SBIT(IT,L2,30,6)
      IF(IBUG.NE.0) PRINT 3000, L1,L2,T
 3000 FORMAT(10X,2I3,12I6)
      IT(1)=IT(1).AND.7777 7777 7777 0000 00008
      ISW=.F.
      IT(2)=IT(3)=0
      IT(4)=8R
      DO 50 I=1,12
      IF(T(I))10,50,20
   10 PRINT 1000,IT,T(I),I
      GO TO 40
 1000 FORMAT(* VAL OUT OF RANGE*4O22,2I5)
   20 IF(T(I).GT.4095 ) GO TO 10
      CALL SBIT(IT,T(I),IN(I),12)
      ISW=.T.
   40 T(I)=0
   50 CONTINUE
      IF(ISW) CALL WRITETP(IT)
      RETURN
      END
```

```
      SUBROUTINE WRITETP(IT)
      DIMENSION IT(4),IBUF(400)
      COMMON/BUG/IBUG
      DATA(IREC=0),(IEND=0),(IB=0)
      DATA LU/3/
      DO 10 I=1,4
   10 IBUF(IB+I)=IT(I)
      IB=IB+4
      IF(IB.LT.400) RETURN
   20 BUFFER OUT(LU,1)(IBUF(1),IBUF(IB))
      IREC=IREC+1
      IF(IBUG.NE.0) PRINT 4000,(IBUF(I),I=1,IB)
      IB=0
 4000 FORMAT(1X,4022)
      IF(UNIT(LU))90,60,50
   50 PRINT 1000,IREC
      STOP
 1000 FORMAT(*END OF TAPE ON LU   BEFORE END OF JOB AT REC=*,I5)
   60 PRINT 2000,IREC
      STOP
 2000 FORMAT(*UNRECOVERED PARITY ERROR ON LU   JOB STOPPED AT REC=*,I5)
      ENTRY WRITEND
      IEND=1
      IF(IB.NE.0)20,90
   90 IF(IEND.EQ.0) RETURN
      ENDFILELU
      ENDFILELU
      PRINT 3000,IREC
      RETURN
 3000 FORMAT(*)END OF FILES WRITTEN ON LU   AFTER REC=*I5)
      END
```

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